

Nature, source and purpose of Management Information Accounting for Management

Purpose and role

Purpose and role of cost and management accounting

The purpose of cost and management accounting is

1. to provide financial information to managers that will help them to plan the activities, control the activities for which they are responsible and see the financial implications of any decisions they may take.
2. It serves management by providing information for planning, decision-making and control.
3. It collects, manages and reports information in demand by managers, employees and decision makers internal to the organisation.
4. Management information is generally supplied in the form of reports.

Reports may be routine (monthly management accounts) or prepared for a specific purpose (e.g. one-off decisions).

Cost accounting and Management accounting

Cost accounting and management accounting are terms which are often used interchangeably. It is not correct to do so.

Cost accounting is part of management accounting.

Cost accounting is mainly concerned with:

Preparing statements (e.g. budgets, costing)

Cost data collection

Applying costs to inventory, products and services

Therefore, management accounting goes beyond cost accounting.

In general, cost accounting information is unsuitable for decision-making.

Financial accounting vs Management accounting.

Compare and contrast financial accounting with cost and management accounting.

	management accounting	financial accounting
1. users and decision-makers	internal use - management and employees	external use - shareholders, banks, government
2. purpose if information	to aid in planning, decision- making and control	to record the financial performance and position of the business
3. legal requirements	none	limited companies must produce financial statements
4. formats	management decide the best way to present information.	according to company law
5. nature of information	most monetary; but also non- monetary information	monetary information
6. time period	historical and forward-looking	mainly historical

Managerial processes

The main functions of management are

1. planning
2. decision-making
3. control

1. **Planning**

Planning involves establishing objectives and selecting appropriate strategies to achieve these objectives. An objective is the aim or goal of an organization.

A strategy is a possible course of action that might enable an organisation to achieve its objectives.

Planning can be either short-term (tactical and operational planning) or long-term (strategic planning).

2. **Decision Making**

Managers of all levels within an organisation take decisions. Decision making always involves a choice between alternatives;

e.g. decide on the selling price to charge for a new product introduced on the market.

The first part of the decision-making process is planning. The second part is control.

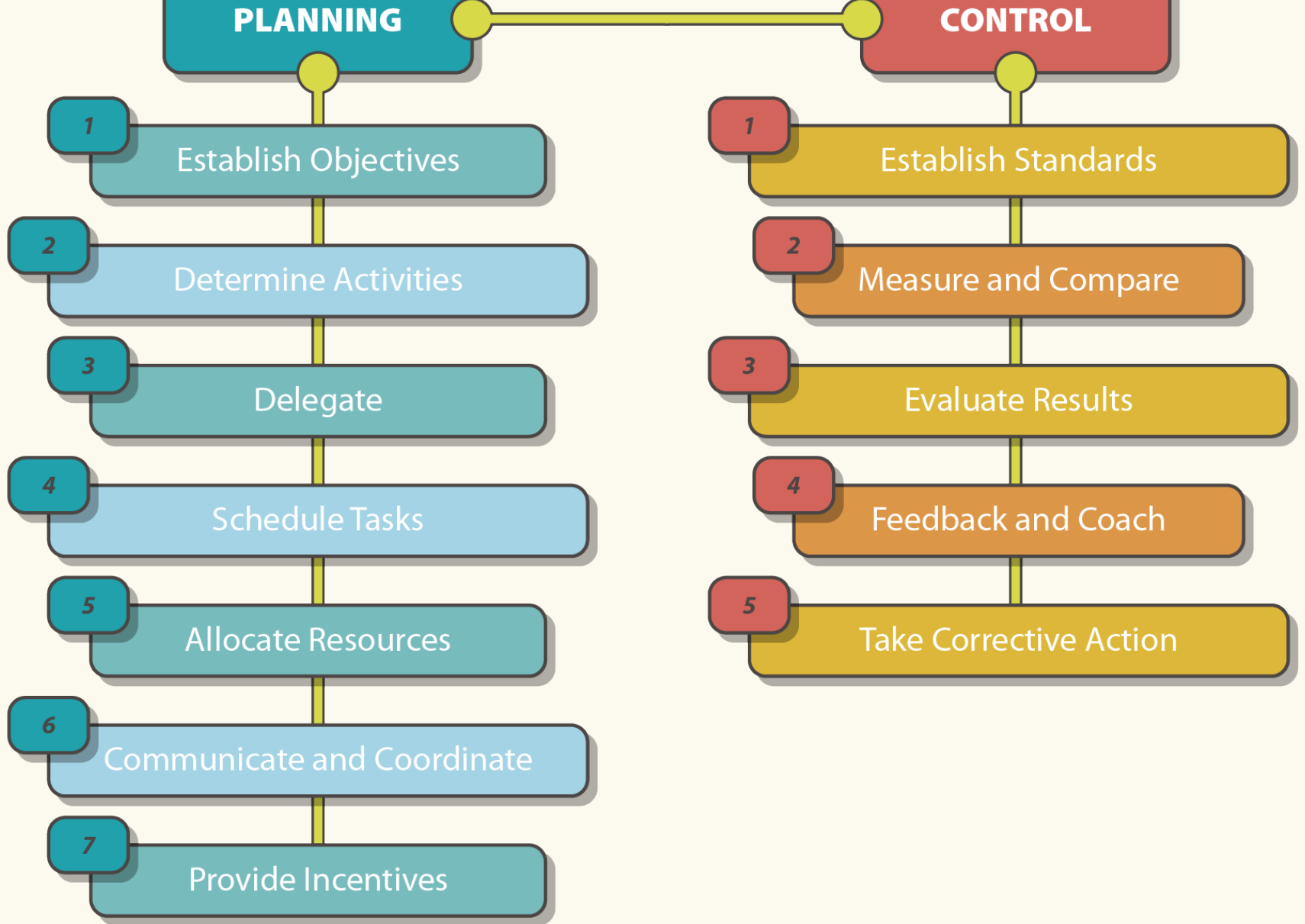
3. **Control**

Managers use the information relating to actual results to take control measures and to re-assess and amend their original budgets or plans.

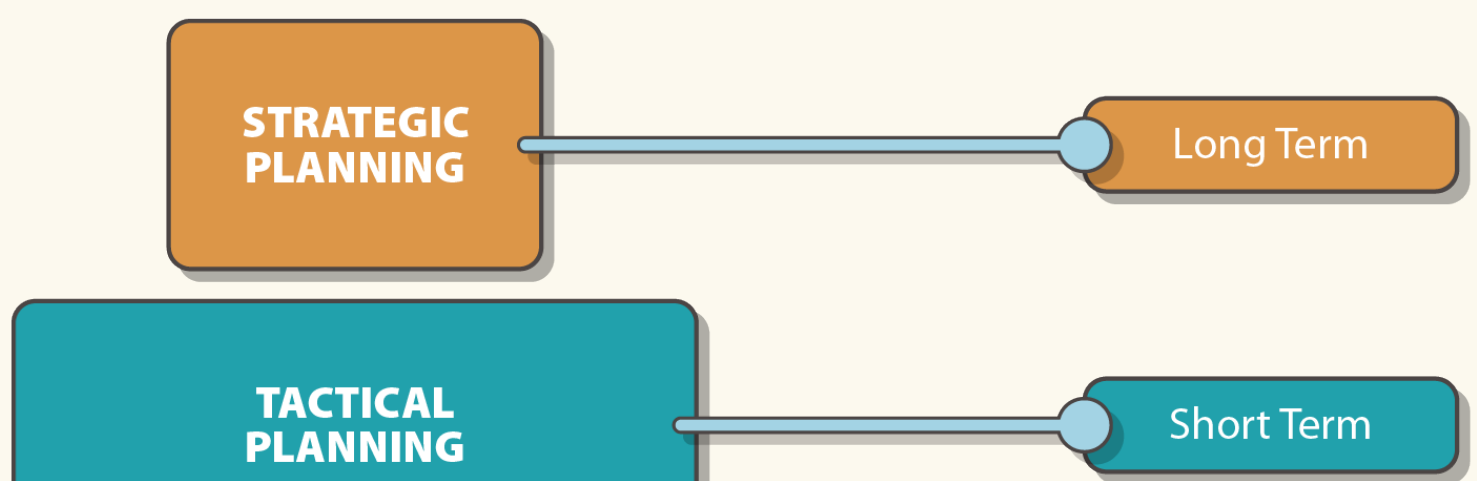
Actual performance of the organisation is compared against detailed operational plans;

e.g. check whether the company is over or under spending on materials. Any deviations from the plans are identified and corrective action is taken.

A management control system measures and corrects the performance of activities of subordinates in order to make sure that the objectives of an organization are being met and the plans devised to attain them are being carried out.



Strategic, Tactical and Operational planning





Strategic Planning

Senior management formulate long-term (e.g. 5 to 10 years) objectives and plans for an organization. Such plans include overall profitability, the profitability of different segments of the business, capital equipment needs and so on.

Tactical Planning

Senior management make medium-term, more detailed plans for the next year, for e.g. decide how the resources of the business should be employed, and to monitor how they are being and have been employed. An example would be: - how many people should be employed next year?

Operational Planning

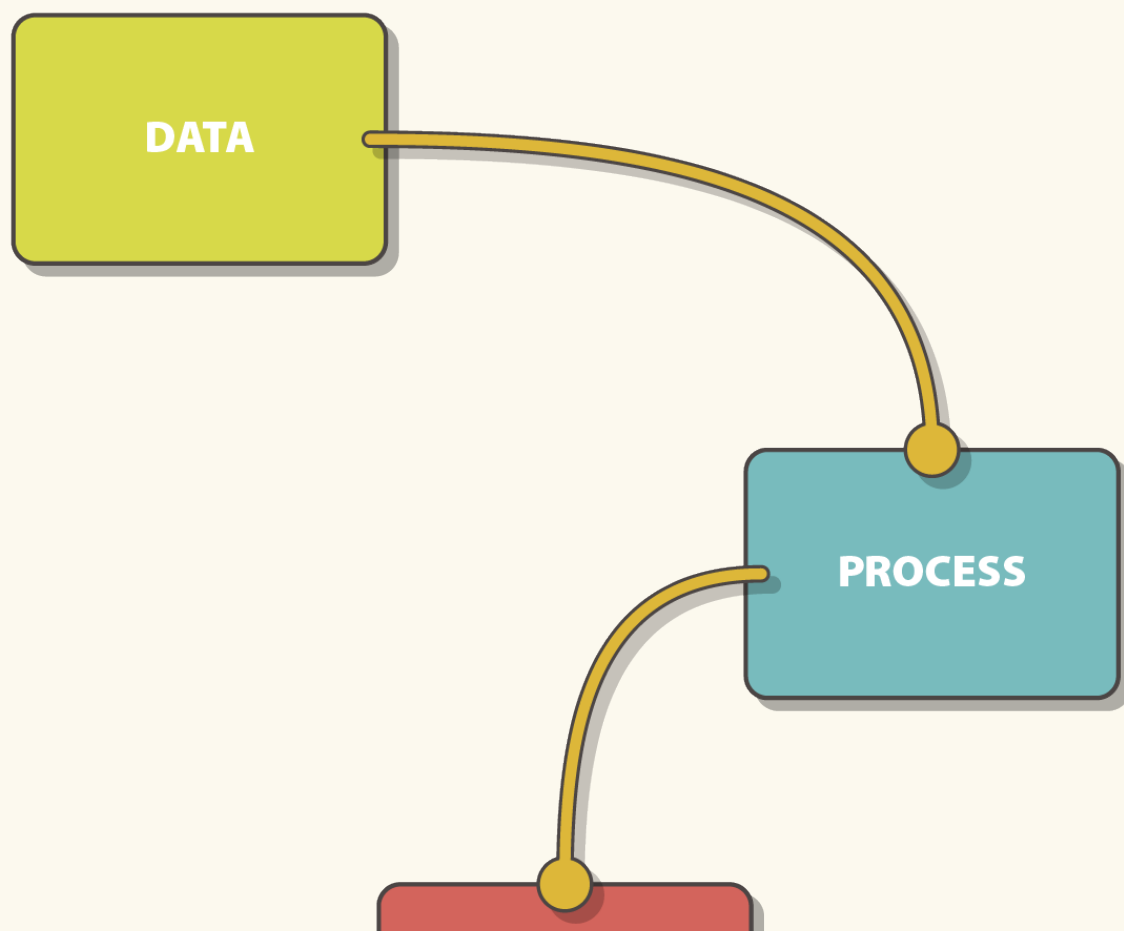
All managers are involved in making day-to-day decisions. 'Front-line' managers such as foremen or senior clerks have to ensure that specific tasks are planned and carried out properly within a factory or office.

Operational information is derived almost entirely from internal sources. It is prepared frequently and is highly detailed. It is mainly quantitative

Data vs information

Data is the raw material for data processing. Data relate to numbers, raw facts, events and transactions which have been recorded but not yet processed into a form suitable for use. Data on its own is meaningless.

Information is *data that has been processed* in such a way as to be meaningful to the person who receives it.



It is the management accountant who is expected to provide the information to management to assist them with their decisions.

Types of information

Most organizations require the following types of information

1. Financial e.g. costs of heat and light, capital costs, etc.
2. Non-financial, e.g. attendance records, details of the number of meals served each day, etc.
3. A combination of financial and non-financial information

While management accounting is mainly concerned with the provision of financial information to aid planning, decision making and control, the management accountant cannot ignore non-financial influences and should qualify the information provided with non-financial matters as appropriate.

Good Information

Good Information

Attributes of good information

Good information should be **ACCURATE**.

Accurate - Information should be accurate because using incorrect information could have serious and damaging consequences.

Complete - An information user should have all the information he needs but it should not be excessive.

Cost-effective - The benefits obtainable from the information must exceed the costs of acquiring it. The value of information results from actions by decision makers who use the information to improve profitability.

Understandable - Information must be clear to the user. If the user does not understand it properly he cannot use it properly.

Relevant - Information must be relevant to the purpose for which a manager wants to use it.

Accessible – Information should be accessible via the appropriate channels of communication and to the right people.

Timely - Information which is not available until after a decision is made will be useful only for comparisons and longer-term control, and may serve no purpose even then. Information prepared too frequently can be a serious disadvantage.

Easy to Use

Limitations of Management Info

Limitations of management information in providing guidance for managerial decision-making

Management accounting information may fail to meet its objective of assisting management in the decision making process. Why?

1. **Failure to meet the requirements of good information listed above**

If information supplied to managers is deficient in any of these respects, then inappropriate management decisions may be made.

2. **The problem of relevant costs and revenues**

Not all information produced by accounting systems is relevant to the decisions made by management.

The figures presented to assist in management decision-making are those that will be affected by the decision, i.e. they should be:

Future – ignoring costs (and revenues) that have already been incurred – ‘sunk costs’

Incremental – ignoring items such as the reapportionment of existing, unchanging fixed costs

Cash flows – ignoring book values, historical costs, depreciation charges.

3. Non-financial information

Managers will not always be guided by the sort of financial and other information supplied by the management accounting system. They will also look at qualitative, behavioural, motivational, even environmental factors. These non-financial factors can be just as important in relation to a decision as financial information – but they are often more difficult to estimate and quantify.

4. External information

The environment refers to all of the external factors which affect a company and includes government actions, competitor actions, customer demands and other factors such as the weather.

Conventional accounting systems focus entirely on internal information such as production costs and volume of output produced.

An organisation should have information on its environment available to it within its accounting information systems – the organisation needs external information as well as internal information.

Sources of Data

Information within and outside the organisation

Different sources of information are available to organisations, including those available within and outside the organisation. Such information will become the input into an organisation’s decision making and management accounting systems.

Classification of data

Data can be classified as: -

1. Primary vs secondary data
2. Discrete vs continuous data
3. Sample vs population data

1. **Primary data** are data collected especially for a specific purpose, e.g. raw data.

Secondary data are data which have already been collected elsewhere, for some other purpose but which can be used or adapted for the survey being conducted, e.g. official statistics, data obtained from financial newspapers, trade journals, etc.

2. **Discrete data** are data which can only take a finite or countable number of values within a range, e.g. you cannot have 1.25 units but 1 unit, 2 units etc.

Continuous data are data which can take on any value. They are measured rather than counted, e.g. a person can be 1.585m tall.

3. **Sample data** are data arising as a result of investigating a sample. A sample is a selection from the population.

Population data are data arising as a result of investigating the population. A population is the group of people or objects of interest to the data collector.

Uses and limitations of published information/data

Internal Sources of Information

1. **Accounting System**

The accounts system will collect data from source documents such as invoices, timesheets and journal entries.

The data will be sorted and analysed by the coding system (described in the next chapter) type of expense, department, manager and job.

Reports of direct and indirect costs compared to budgets may be produced at regular intervals to help managers plan and control costs.

Ad hoc reports may be produced to help managers make specific decisions.

2. **Payroll System**

The payroll system may provide information concerning detailed labour costs.

Hours paid may be analysed into productive work and non-productive time such as training, sick, holiday, and idle time.

Labour turnover by department or manager may be analysed and may help management to assess the employment and motivation policies. These will be described in more detail later on.

3. **Strategic Planning System**

The strategic planning system may provide information relating to the organisation's objectives and targets. Assumptions relating to the external environment may be detailed.

Details of the organisation's capital investment programme and product launch programme may also be recorded here.

Some of this information will be very commercially sensitive and only accessed by top managers in the organisation

External Sources of Information

Businesses are finding it increasingly difficult to succeed if they ignore the external environment which will influence their activities.

The process is known as environmental scanning or environmental monitor. Data is collected from outside, as well as from inside, the organisation and used in the decision-making process.

It is important to note that internal information is produced by the company itself so they are aware of any limitations in its quality or reliability.

External information is not under the control of the organisation - they may not be aware of any limitations in its quality.

1. **Government Sources**

The primary purpose of this data is to provide information for economic planning at the national level.

This data also serves the purpose of providing industry with useful background information for deciding on future policies such as raising new finance or recruiting specialised labour.

The data is only published in general terms (e.g. for a particular industry or geographical area).

2. **Business Contacts**

Government-produced information will be broadly based and general, dealing with the economy as a whole or particular sectors or industries.

An organisation may be looking for information more focused on its own position. Its day-to-day business contacts, customers and suppliers, can be a useful source of this information.

- **Customers** can provide information on such matters as:
 - The product specification which they require and their quality requirements
 - Requirements for delivery periods
 - Preference for packaging and distribution methods
 - Feedback on the above and on general aspects of customer service.
- **Suppliers** may be able to provide information on:
 - Quantity discounts and volume rebates which may help the organisation to decide on order size
 - Availability of products and services
 - Alternative products or services which may be available or may become available
 - Technical specifications of their product

technical specifications of their product.

3. **Trade Associations and Trade Journals**

Most major industries have their own trade association. The role of these organisations includes:

- Representing their member firms in legal and other disputes
- Providing quality assurance schemes for customers of member organisations
- Laying down codes of practice to be followed by their member organisations
- Publishing trade journals and other information useful for the management and development of their businesses.

4. **The Financial Press, Business Press and Other Media**

In the UK, particular newspapers such as The Financial Times, the Guardian, The Times and the Daily Telegraph provide statistics and financial reviews as well as business economic news and commentary.

Such information is now also widely available via electronic media and digital television services (such as Bloomberg TV).

There is also the internet as a widely available source of up-to-date financial information.

5. **The Internet**

The internet is a global network allowing any computer with a telecommunications link to send and receive information to and from any other computer.

Information on the internet is not necessarily good information. The reliability and reputation of the provider is important.

General economic environment

The impact of general economic environment on costs/revenues

The economic environment affects firms at national and international level, both in the general level of economic activity and in particular factors, e.g. inflation, interest rates and exchange rates.

Inflation affects the decisions taken by businesses. An increase in interest rates affects cash flow especially for those businesses which carry a high level of debt. Exchange rates affect the imports and exports of the company.

Even the state of the economy will influence the planning process of an organisation. In times of boom, consumer demand and consumption increases.

In times of recession, the company has to focus on its survival through cost effectiveness and competition.

Sampling Technique

Sampling Technique

The purpose of sampling is to gain as much information as possible about the population by observing only a small proportion of that population

i.e. by observing a sample. The sample must be of a certain size.

The term population is used to mean all the items under consideration in a particular enquiry.

A sample is a group of items drawn from that population.

For example, in order to ascertain which television programmes are most popular, a sample of the total viewing public is interviewed and, based on their replies, the programmes can be listed in order of popularity with all viewers.

Sampling Techniques

A probability sampling method is a sampling method in which there is a known chance of each member of the population appearing in the sample.

Probability sampling methods are:

1. Random
2. Systematic
3. Stratified random
4. Multi-stage
5. Cluster

Quota sampling is a non-probability sampling method, i.e. the chance of each member of the population appearing in the sample is not known.

Appropriate sampling method

Sampling method in a specific situation

1. Random Sampling

A simple random sample is defined as a sample taken in such a way that every member of the population has an equal chance of being selected. The normal way of achieving this is by numbering each item in the population.

If a sample of, say 20, items is required then 20 numbers from a table of random numbers are taken and the corresponding items are extracted from the population to form the sample (sampling frame)

e.g. in selecting a sample of invoices for an audit. Since the invoices are already numbered, this method can be applied with the minimum of difficulty.

This method has obvious limitations when either the population is extremely large or, in fact not known. The following methods are more applicable in these cases.

2. Systematic Sampling

If the population is known to contain 50,000 items and a sample of size 500 is required, then 1 in every 100 items is selected.

The first item is determined by choosing randomly a number between 1 and 100 e.g. 67, then the second item will be the 167th, the third will be the 267th... up to the 49,967th item.

Strictly speaking, systematic sampling (also called quasi-random) is not truly random as only the first item is selected randomly. However, it gives a very close approximation to random sampling and it is very widely used.

There is danger of bias if the population has a repetitive structure. For example, if a street has five types of house arranged in the order, A B C D E A B C D E... etc, an interviewer visiting every fifth home would only visit one type of house.

Systematic sampling should not be used if the population follows a repetitive pattern.

3. Stratified Sampling

If the population under consideration contains several well defined groups (called strata or layers),

e.g. men and women, smokers and non-smokers, etc, then a random sample is taken from each group.

The number in each sample is proportional to the size of that group in the population and is known as sampling with **probability proportional to size**.

For example, in selecting a sample of people in order to discover their leisure habits, age could be an important factor.

So if 20% of the population are over 60 years of age 65% between 18 and 60 and 15% are under 18, then a sample of 200 people should contain 40 (20% x 200) who are over 60 years old, 130 (65% x 200) people between 18 and 60 and 30 (15% x 200) under 18 years of age.

This method ensures that a representative cross-section of the strata in the population is obtained, which may not be the case with a simple random sample of the whole population.

The method is often used by auditors to choose a sample to confirm receivables' balances. In this case a greater proportion of larger balances will be selected.

4. **Multi-Stage Sampling**

This method is often applied if the population is particularly large, for example all TV viewers in Malta. The process involved here would be as follows:

Step 1 The country is divided into areas (towns and villages) and a random sample of areas is taken.

Step 2 Each area chosen in Step 1 is then subdivided into smaller areas and a random sample of this is taken.

Step 3 Each area chosen in Step 2 is further divided into roads and a random sample of roads is then taken.

Step 4 From each road chosen in Step 3 a random sample of houses is taken and the occupiers interviewed.

This method is used, for example, in selecting a sample for a national opinion poll. Fewer investigators are needed and hence it is less costly.

However, there is the possibility of bias if a small number of occupiers are interviewed.

5. **Cluster Sampling**

This method is similar to the previous one in that the country is split into areas and a random sample taken. Further sub-divisions can be made until the required number of small areas have been determined.

Then every house in each area will be visited instead of just a random sample of houses. In many ways this is a simpler and less costly procedure as no time is wasted finding particular houses and the amount of travelling by interviewers is much reduced.

6. **Quota Sampling**

Quota sampling is a non-probability sampling method in which the chance of each member of the population appearing in the sample is not known.

With quota sampling, the interviewer will be given a list compromising the different types of people to be questioned and the number of quota of each type

e.g. 20 males, aged 20 to 30 years, manual workers; 15 females, 25 to 35, not working; 10 males, 55 to 60, professionals, etc. The interviewer can use any method to obtain such people until the various quotas are filled.

This is very similar to stratified sampling, but no attempt is made to select respondents by a proper random method, consequently the sample may be very biased.

Cost Classification

Production costs and Non-Production costs

For the preparation of financial statements, costs are often classified as: - production and non-production costs.

Production costs

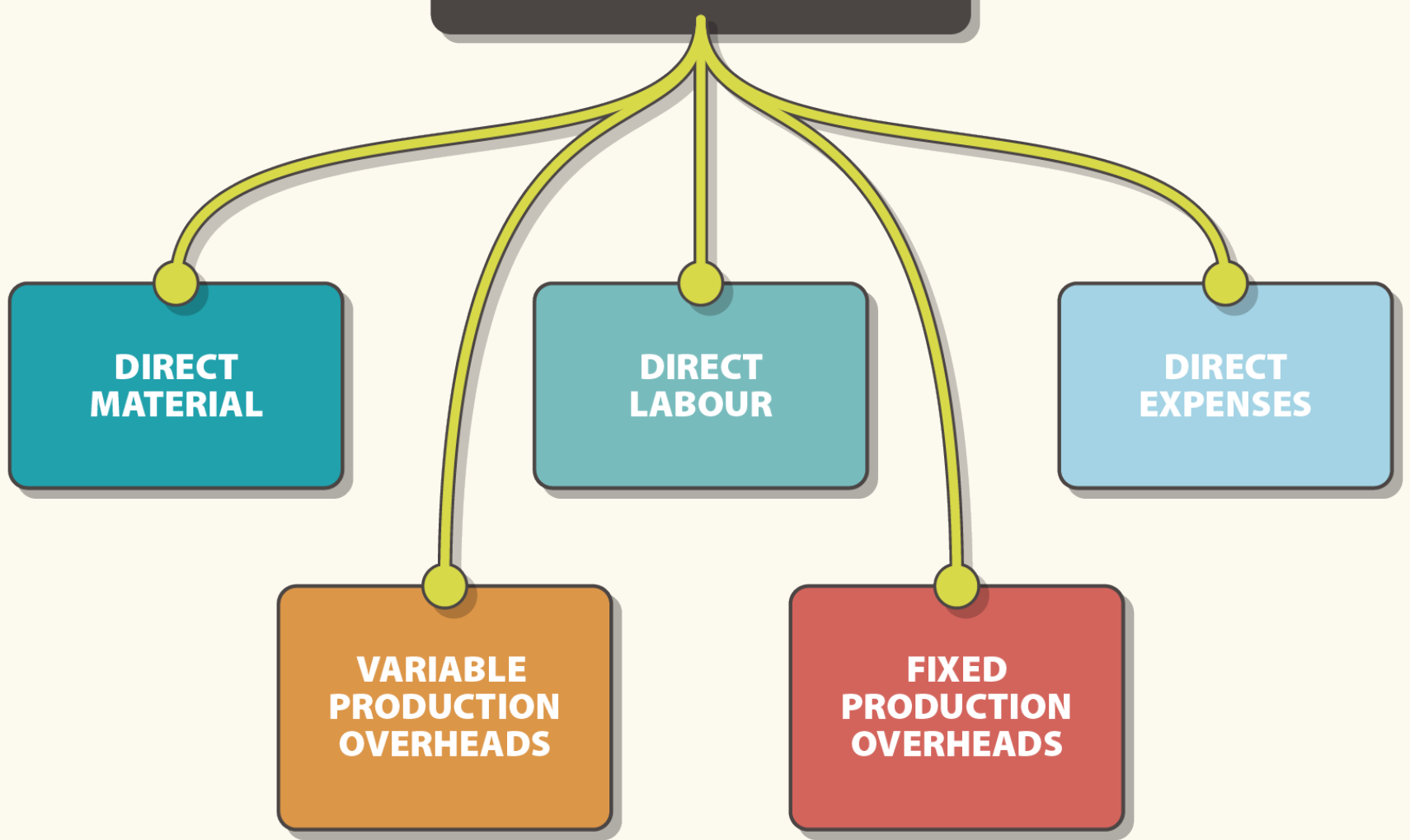
Production costs are costs identified with goods produced for resale. Production costs are all the costs involved in the manufacture of goods, i.e. direct material, direct labour, direct expenses, variable production overheads and fixed production overheads.

Non-production costs

Non-production costs are not directly associated with production of manufactured goods. They are taken directly to the income statement as expenses in the period in which they are incurred; such costs consist of administrative costs, selling and distribution expenses, and finance costs.

Different elements of production cost

Different elements of production cost



Costs can be classified by element: materials, labour and overheads (expenses).

Materials

This includes all costs of materials purchased for production or non-production activities, e.g. raw materials and components.

Labour

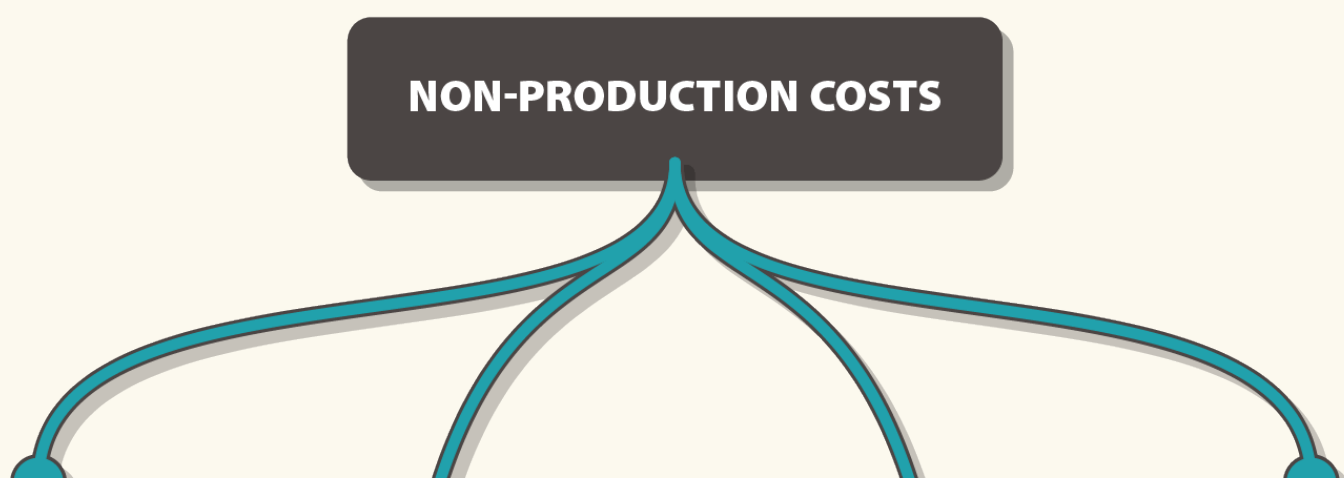
This includes all staff costs relating to employees.

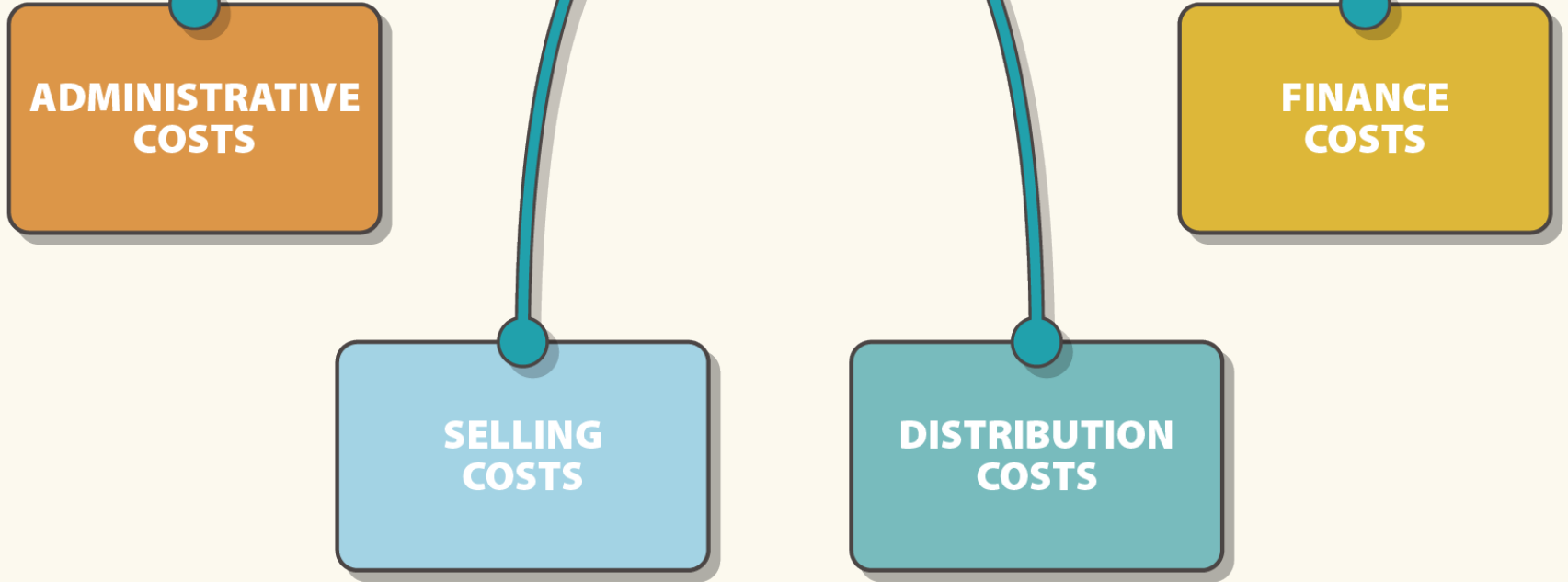
Overheads

Overheads include all other costs which are not materials or labour. These include rent, telephone, and depreciation of equipment.

Different elements of non production costs

Different elements of non production costs





Administrative costs

These include all the costs involved in running the general administration department of an organization.

Examples of administrative costs include: -

- Depreciation of office buildings and equipment.

- Office salaries, including salaries of directors, secretaries and accountants.

- Rent, rates, insurance, lighting, cleaning, telephone charges and others.

Selling costs

Selling costs include all costs incurred in promoting sales and retaining customers.

Examples of selling costs are: -

- Salaries and commission of salesmen and sales department staff.

Advertising and sales promotion, market research.

Rent, rates and insurance of sales offices and showroom.

Distribution costs

Distribution costs include all costs incurred in making the packed product ready for dispatch and delivering it to the customer.

Examples of distribution overhead are:

Delivery costs

Wages of packers, drivers and despatch clerks.

Insurance charges, rent, rates and depreciation of warehouse.

Finance costs

Finance costs include all the costs that are incurred in order to finance an organization, for e.g. loan interest.

Non-production costs are taken directly to the income statement as expenses in the period in which they are incurred.

Product/service costs

Direct costs

Direct costs

These are costs which can be directly identified with a specific cost unit or cost centre. There are 3 main types of direct cost

Direct materials: - materials used in making and selling a product (or even providing a service); e.g. raw material, packing material.

Direct labour: - the specific costs of the workforce used to make a product or provide a service.

Direct expenses: - any expenses which are incurred on a specific product other than direct material cost and direct wages, e.g. depreciation of machine used in the production of the goods.

Direct Materials + Direct Labour + Direct Expenses = PRIME COST

Indirect costs

These are costs which cannot be directly identified with a specific cost unit or cost centre. These costs cannot be easily traced to a specific product.

Indirect materials: - those costs which cannot be traced in the finished product. E.g. oil for machine in a production line.

Indirect labour: - all wages not charged directly to a product. These include wages of non-productive personnel in the production department, example supervisor.

Indirect expenses: – These are costs not directly charged to production. Examples are rent, rates and insurance of a factory, depreciation, fuel, power, maintenance of plant, machinery and buildings.

Indirect Materials + Indirect Labour + Indirect Expenses = Overheads

Classification by Function

Classification by function involves classifying costs as production/manufacturing costs, administration costs or marketing/selling and distribution costs. These costs have been defined earlier on in this chapter. Note that expenses that do not fall into one of these classifications might be categorized as general overheads or even listed as a classification of their own, e.g. research and development costs.

Please note that research costs are the costs of searching for new or improved products. Development costs are the costs incurred between the decision to produce a new or improved product and the commencement of full manufacture of the product.

Codes in categorising transaction

A code is "a system of symbols designed to be applied to a classified set of items to give a brief accurate reference, facilitating entry, collation and analysis".

A cost coding system is therefore based on the selected cost classifications. It provides a way of expressing the classification of each cost in a shortened symbolized form.

To use descriptions only of the items would lead to ambiguities and difficulties in recording and processing the information. The items need to be logically coded. For example, 5 cm brass plates may be coded as 05677 and no other class of item should be coded the same.

The advantages of a coding system

Some of the advantages of a well-designed coding system are

1. It is more suitable than a description in computerised system.
2. A code reduces ambiguity.
3. A code is usually briefer than description.

The requirements for an efficient coding system

The codes will either be all numerical or all alphabetical.

The codes will be brief, have a logical structure and be of the same length- for example, 5 digits long.

There will be no ambiguities in the codes and the system must be such that all items can be assigned a code.

The code must be capable of expansion so that new items can be accommodated.

The control of the coding system will be centralised to avoid the proliferation and duplication of codes

Types of Code

1. **Composite codes**

The CIMA terminology describes the use of composite symbols in codes. The first three digits in the composite code might indicate the nature of the expense whereas the last three digits might indicate the cost centre or the cost unit to be charged.

For example:

Symbol 892.133 means:

- 8 – labour
- 9 – semi-skilled
- 2 – grade 2
- These codes are showing this was semi-skilled labour
- 1 – indirect cost
- 1 – Factory XYZ
- 3 – finishing department
- This code shows us this labour expenditure is to be charged as indirect labour to the finishing department in factory XYZ

2. **Sequence (or progressive) codes**

A sequential code simply follows a sequence. Imagine we are drafting a register for employees for salary purposes. We begin with the first employee being assigned the number 00, the second employee is assigned the number 01 and so on. In this code, we have allowed for there to be as many as 100 employees, since we have allocated 2 digits to the code and can assign all of the numbers from 00 to 99, 100 numbers, to that number of employees:

00 Cassar 01 Farrugia 02 Vella 03 T Borg ... 34 S Borg ... 67 Abela ...

If a new employee were to join this group? He would become employee 68

3. **Group classification codes**

Group classification (block) codes are very common in accounting circles in that they commonly form the basis of charts of accounts, as depicted below:

- 1000 – Non-current assets
- 2000 – Current assets (excl. inventories)
- 3000 – Inventories
- 4000 – Non-current liabilities
- 5000 – Current liabilities
- 6000 – Equity
- 7000 – Revenues
- 8000 – Expenditures

The 1000 “Block” is allocated to non-current assets. This means that it is possible to classify up to 1,000 different non-current assets using this block. Of course, there may be sub blocks so that we can extend the range of non-current assets we can have.

4. Faceted codes

A faceted code is one that is broken down into a number of facets or fields, each of which signifies a unit of information. We could use a chart of accounts, that is commonly faceted; but let’s work through the faceted code of a furniture manufacturer. We’ll consider a code that will deal with direct materials, direct labour, and indirect costs.

In this example, there are three facets, or fields, to the code:

- Facet 1 is the department or cost centre, and is 2 digits long
- Facet 2 is the cost heading, and is 2 digits long
- Facet 3 is the cost item, and is 4 digits long

- Facet 1:
- 00 Preparation
 - 01 Carpentry
 - 02 Assembly
 - 03 Finishing
 - 04 Upholstery

- Facet 2:
- 00 Direct materials
 - 01 Direct labour
 - 02 Direct expenses
 - 03 Indirect costs

- Facet 3:
- 0000 – 0100 Direct material descriptions
 - 0101 – 0150 Direct labour grades
 - 0151 – 0500 Factory overhead cost items

Facets 1 and 2 should need little further explanation; but let’s expand Facet 3.

- Facet 3:
- 0000 Oak batten 2 cm x 4 cm
 - 0003 Oak plank 20 cm x 4 cm
 - 0020 Seat covering, plain
 - 0025 Seat covering, striped
 - 0040 Foam padding
 - 0050 Chair brackets, metal, steel
 - 0055 Chair brackets, metal, brass

0055 Chair brackets, metal, brass

- 0101 Preparation department labour grade 1
 - 0102 Preparation department labour grade 2
- 0111 Carpentry department labour grade 1
- 0112 Carpentry department labour grade 2
- 0151 Factory rent
- 0152 Factory rates
- 0160 Insurance: machinery
- 0161 Insurance: buildings
- 0162 Insurance: public liability

Let's use this code shown now to determine the code for grade 2 labour costs incurred by the carpentry department. The code is:

01 01 0112;

and the code for buildings insurance for the upholstery department is:

04 03 0161.

5. Significant digit codes

These incorporate some digits which are part of the description of the item being coded.

Example: 4000 = Nails

- 4010 = 10mm nails
- 4020 = 20 mm nails
- 4030 = 30 mm nails

6. Hierarchical codes

The coding systems used by libraries are examples of hierarchical codes. The major advantage of such systems is that they are, in theory at least, infinitely expandable: they can be extended for ever; but in a logical, structured, way.

If we assume that code 657 is the library classification number for accounting, then we can develop the code hierarchically:

- 657 Accounting
 - 657.01 Financial accounting
 - 657.02 Financial management
 - 657.03 Management accounting
 - 657.03.001 Management accounting, standard costing
 - 657.03.001.01 Management accounting, standard costing, setting standards
 - 657.03.001.02 Management accounting, standard costing, variance analysis

and so on ...

The drawback of infinite expandability is that it would need an infinitely large storage device to store an infinitely large code!

Different types of cost behaviour

Types of cost behaviour

Costs can be classified according to the way that they behave within different levels of activity. Cost behaviour tends to classify costs as

Variable cost

Fixed cost

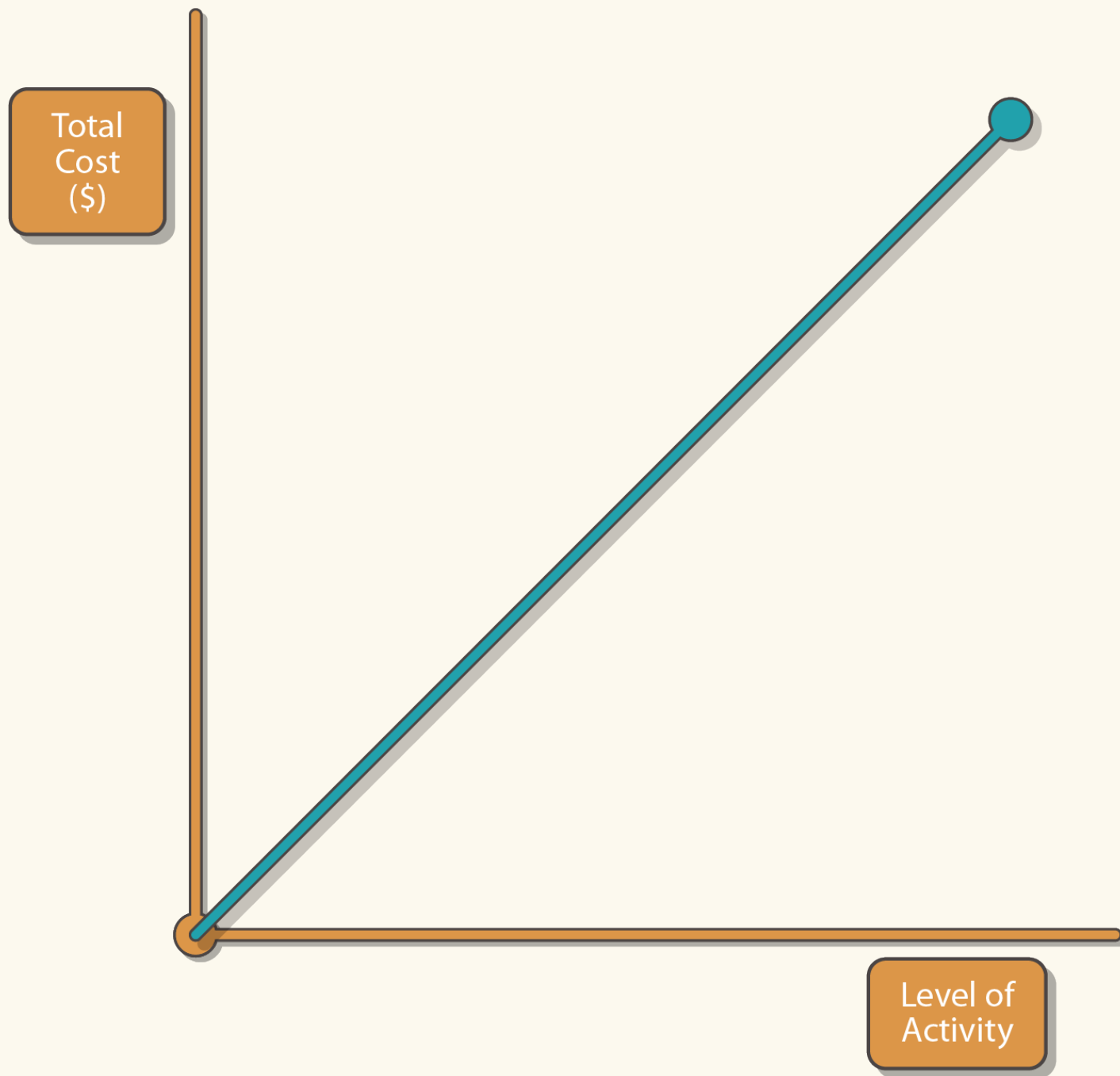
Stepped fixed cost

Semi-variable cost

Variable cost

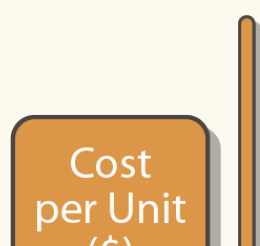
A variable cost is a cost which tends to vary directly with the volume of output. As total costs increase with activity levels, the variable cost per unit remains constant. By their nature, direct costs will be variable costs. Examples of variable costs include raw materials and direct labour.

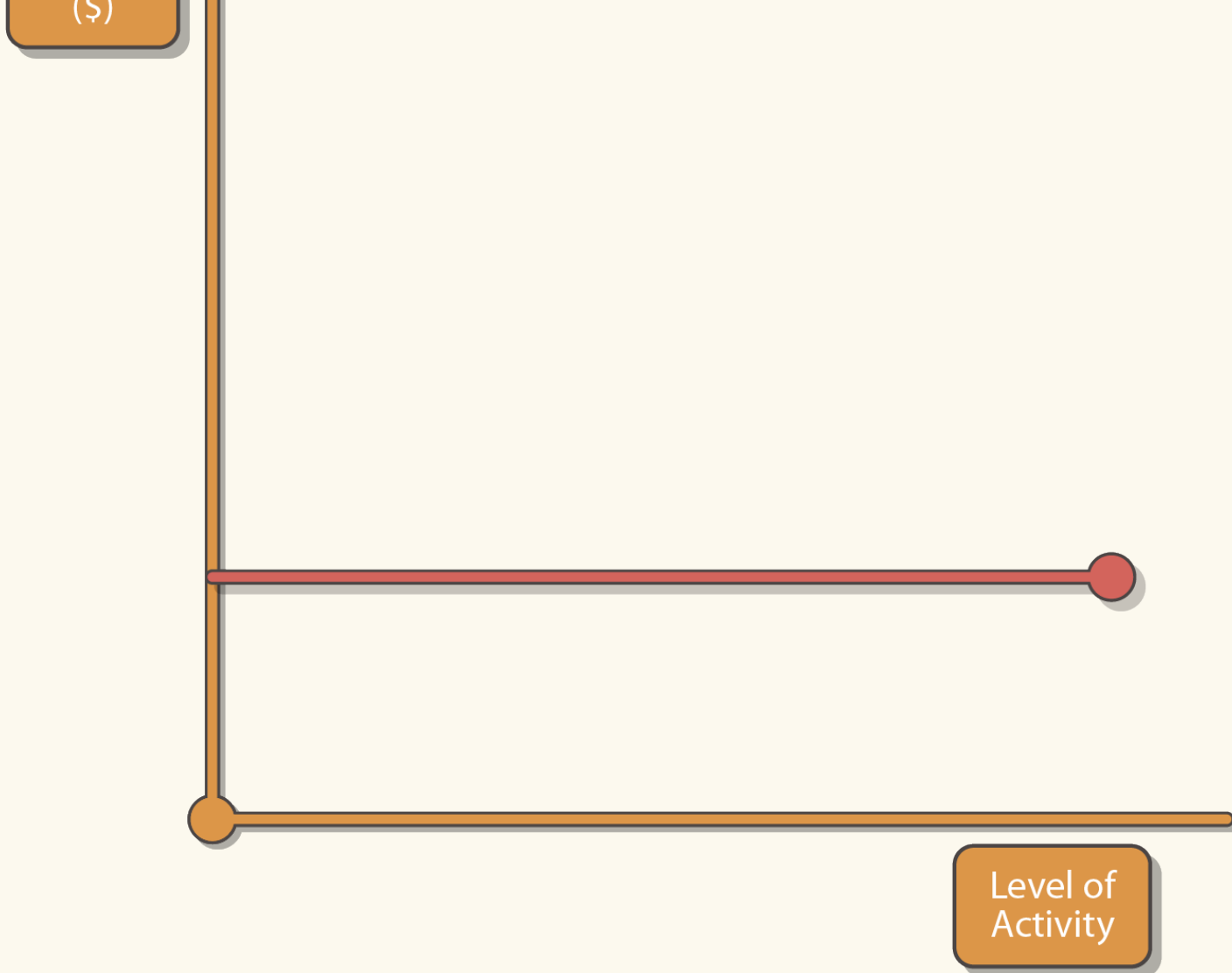
Graph 1: - Total variable costs



Variable costs in total change in direct proportion to the level of activity.

Graph 2: - Variable cost per unit





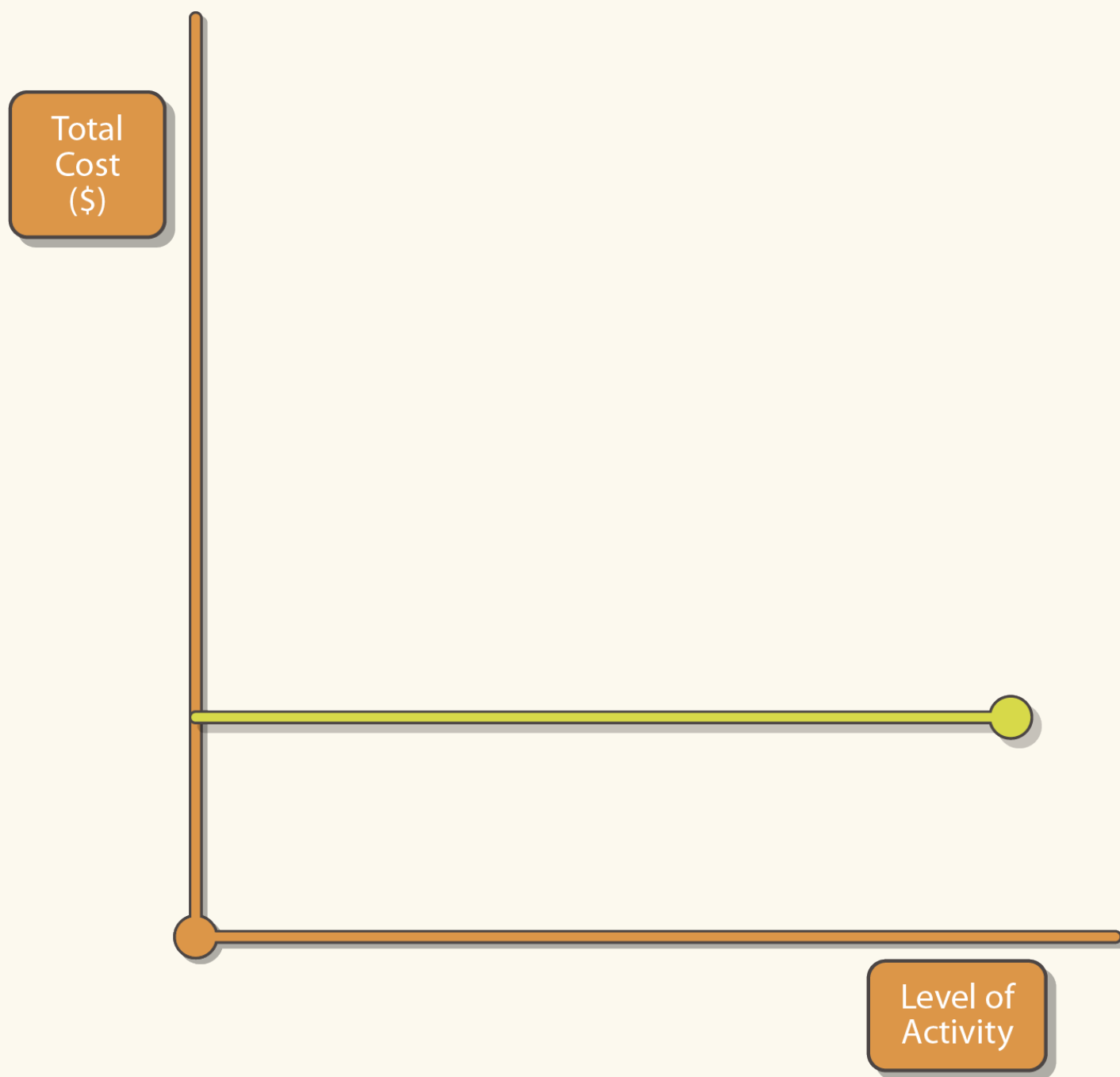
The cost per unit of variable costs remains constant.

Fixed Costs

A fixed cost is a cost which is incurred for an accounting period, and which, within certain activity levels remains constant.

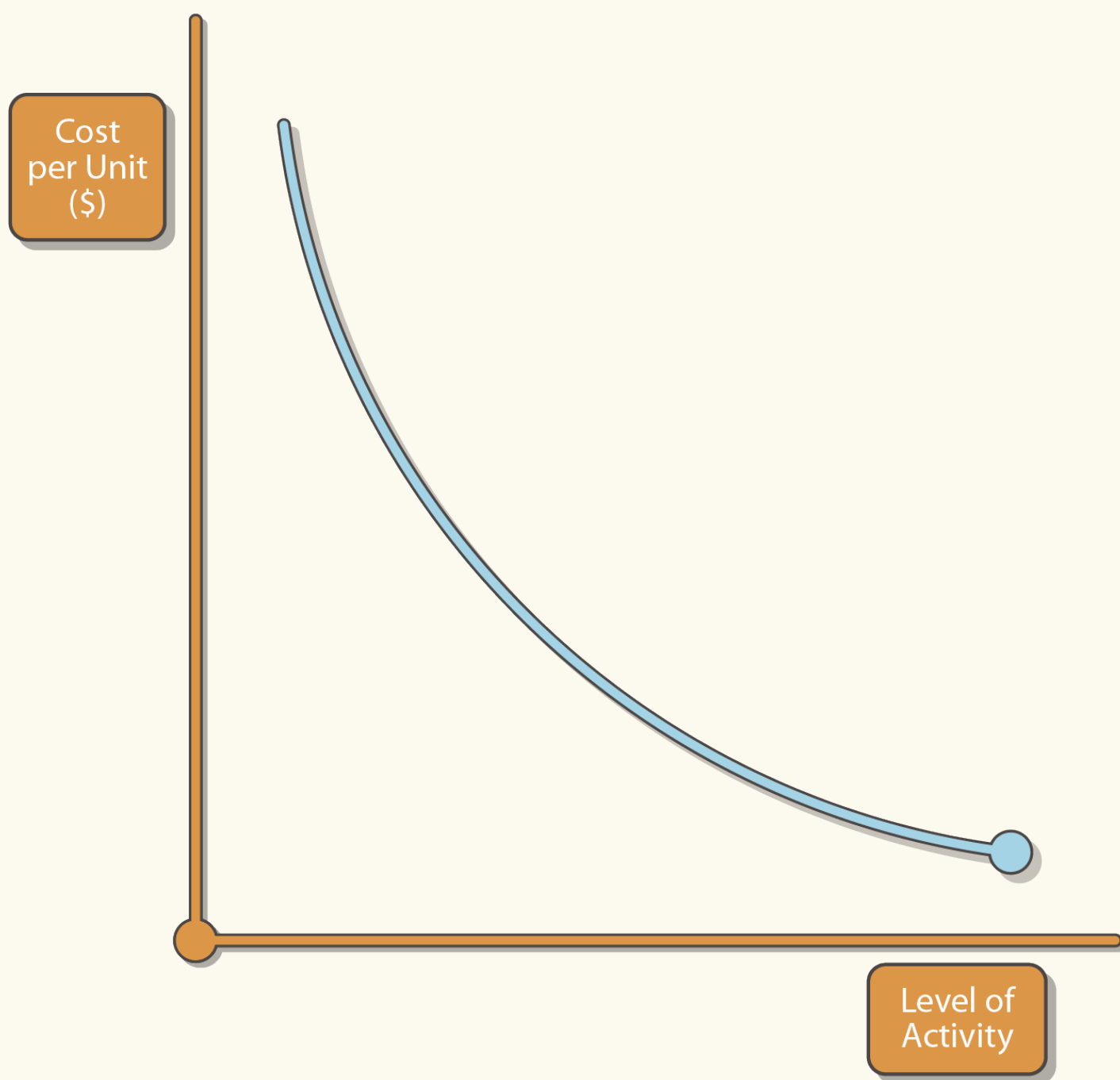
Examples of fixed costs include the salary of the managing director, the rent of a building and straight line depreciation of machinery.

Graph 3: - Total Fixed Costs



Total fixed costs remain constant over a given level of activity.

Graph 4: - Fixed cost per unit



The fixed cost per unit falls as the level of activity increases but never reaches zero.

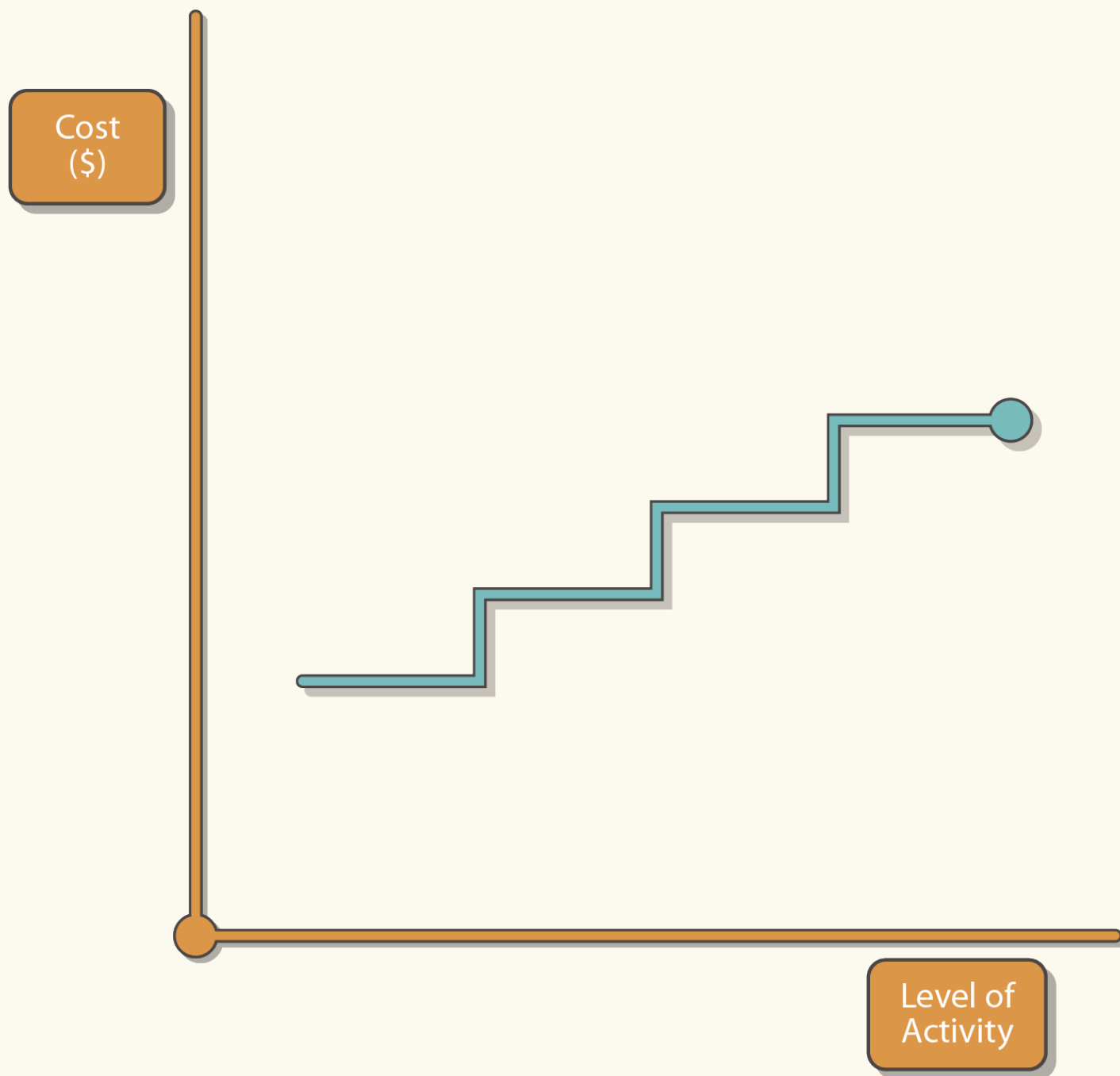
Stepped Fixed Costs

A stepped fixed cost is only fixed within certain levels of activity. The depreciation of a machine may be fixed if production remains below 1,000 units per month. If production exceeds 1,000 units, a second machine may be required, and the cost of depreciation (on two machines) would go up a step.

depreciation (on two machines) would go up a step.

Other stepped fixed costs include rent of warehouse (more space required if activity increases) and supervisors' wages (more supervisors required if number of employees increase).

Graph 5: - Stepped fixed costs



Fixed costs increase in steps as activity level increases beyond a certain limit.

Semi-variable Costs (semi-fixed/mixed)

Semi-variable costs contain both fixed and variable components and are therefore partly affected by changes in the level of activity.

Examples of semi-variable costs includes

Electricity and gas bills -

Fixed cost = standing charge

Variable cost = commission on sales made

Salesman's salary -

Fixed cost = basic salary

Variable cost = commission on sales made

Costs of running a car

Fixed cost = road tax, insurance

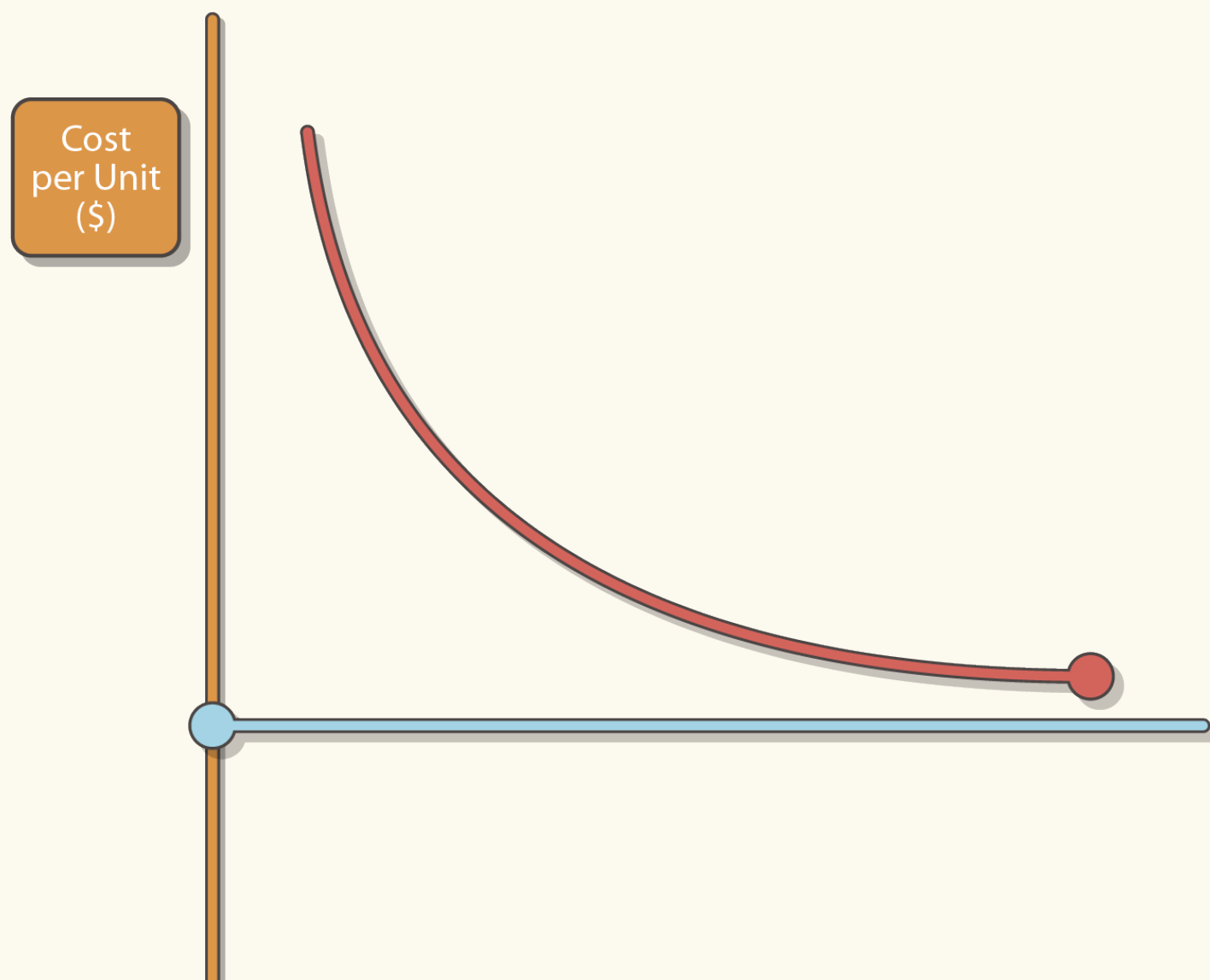
Variable costs = petrol, oil, repairs

Graph 6: - Total semi-variable costs



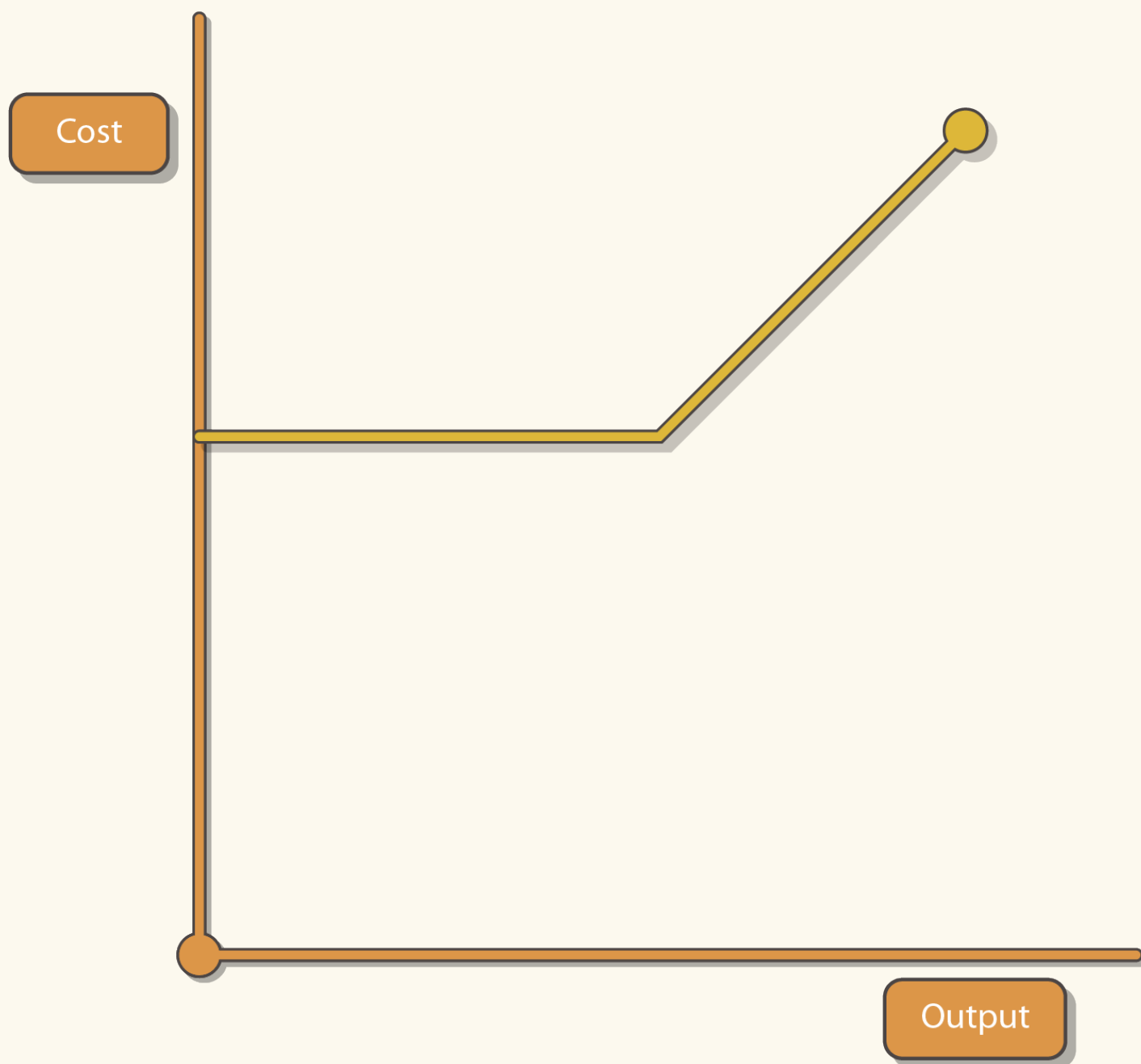


Graph 7: - Semi-variable costs per unit



Level of
Activity

Graph 8: - Other cost behaviour patterns



This graph represents a cost which is variable with output, subject to a minimum (fixed) charge.

High/low analysis

Use high/low analysis

There are two main methods which analyse semi-variable costs into their fixed and variable elements

High/low method

Least squares regression

High-low method

The main steps are

1. Review records of costs in previous periods.
 - Select the period with the highest activity level.
 - Select the period with the lowest activity level
2. Find the variable cost per unit

Total cost at high activity level - total cost at low activity level

Total units at high activity level - total units at low activity level

3. Find the fixed costs

Total cost at high activity level – (Total units at high activity level × Variable cost per unit)

Advantages of the High-Low Method

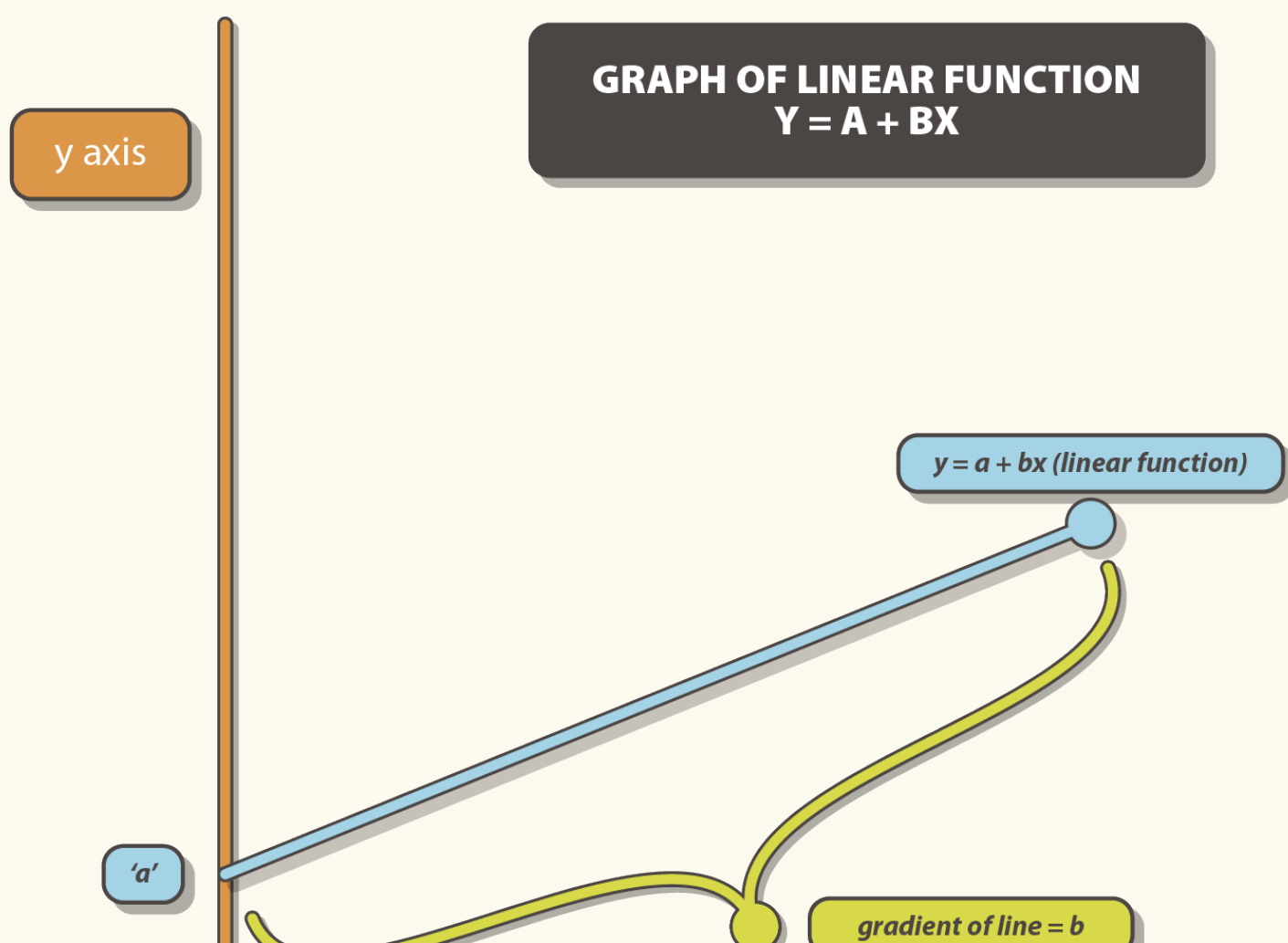
1. Easy to use
2. Easy to understand

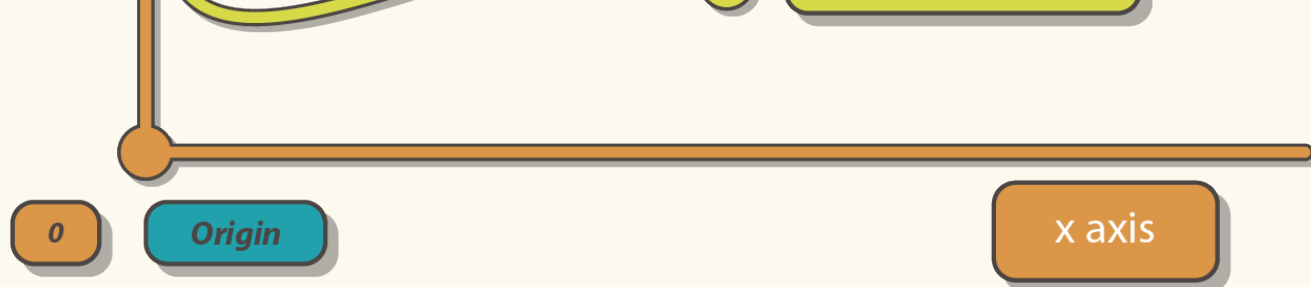
Limitations of the High-Low Method

1. It relies on historical cost data – predictions of future costs may not be reliable
2. It assumes that the activity level is the only factor affecting costs
3. It uses only two values to predict costs
4. Bulk discounts may be available at large quantities

Linear functions and equations

Equation of a straight line: $y = a + bx$





The equation of a straight line is $y = a + bx$

'a' – the intercept, i.e. the value of y when $x = 0$

'b' – the gradient of the line $y = a + bx$ (the change in y when x increases by one unit)

'x' – the independent variable

'y' – the dependent variable

Cost Equation

'a' is the fixed cost per period

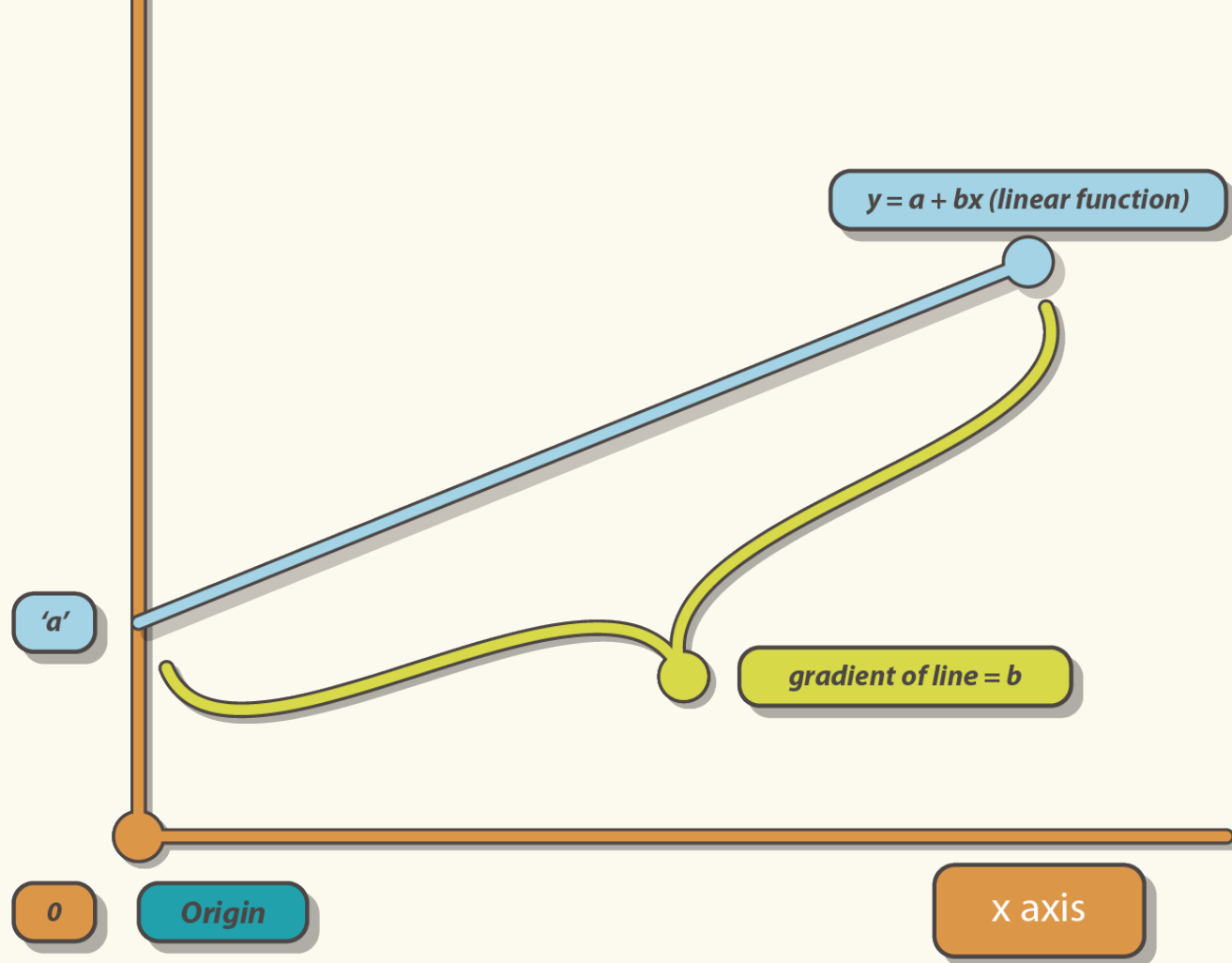
'b' is the variable cost per unit

'x' is the activity level

'y' is the total cost = fixed cost + variable cost



GRAPH OF LINEAR FUNCTION
 $Y = A + BX$



Cost objects, cost units and cost centres

Cost Objects

A cost object is any activity for which a separate measurement of cost is undertaken. E.g. cost of a product, cost of a service, cost of a particular department.

Cost Units

A cost unit is a unit of product or service in relation to which costs are ascertained. E.g. a hotel room, a course, one litre of paint.

Cost Centres

A cost center is a production or service location, function, activity or item of equipment for which costs can be ascertained. E.g. a department, a project, a machine.

Cost cards

A cost card lists out all the costs involved in making one unit of a product

cost card	\$
direct materials	x
direct labour	x
direct expenses	x

prime cost	xx
variable production overheads	x

marginal production cost	xx
fixed production overheads	x

total production cost	xx
<u>non production overheads</u>	
administration	x
selling	x
distribution	x

total cost	xx
profit	x

sales prices	xxx
	===

Cost, profit, investment and revenue centres

Each manager must have a well-defined area of responsibility and the authority to make decisions within that area. An area of responsibility may be structured as

Cost centre

A cost centre is a production or service location, function, activity or item of equipment whose costs are identified and recorded; e.g. manufacturing department, purchasing department and paint shop.

Revenue centre

A revenue centre is accountable for revenues only. Revenue centre managers should normally have control over how revenues are raised; e.g. retail outlet, sales department and airline reservation department.

Profit centre

A profit centre is a part of the business for which both costs and revenues are identified; e.g. product division

Investment centre

An investment centre is a profit centre with additional responsibilities for capital investment and possibly for financing, and whose performance is measured by its return on capital employed (ROCE); e.g. subsidiary company

Cost centres, revenue centres, profit centres and investment centres are also known as **responsibility centres**.

Differing needs for information

Cost centres

Cost centre managers will want information regarding cost of material, labour, expenses and overheads. The performance of the manager is judged on the extent to which cost targets have been achieved.

Revenue centres

Revenue centre managers will want information on markets and new products and they will look closely at pricing and the sales performance of competitors – in addition to monitoring revenue figures

Profit centres

Profit centre managers will want information regarding both revenues and costs. They will be judged on the profit margin

Profit centre managers will want information regarding both revenues and costs. They will be judged on the profit margin achieved by their division.

Investment centres

Investment centre managers will want the same information as the profit centre manager and in addition they will require quite detailed appraisals of possible investments and information regarding the results of investments already undertaken.

Presenting Information

Written reports

Written reports representing management information

When producing written reports, the management accountant needs to carry out four steps

1. Prepare: determine the type of document required and establish the user of the information
2. Plan: select the relevant data: summarise, analyse, illustrate to turn the raw data into useful information
3. Write
4. Review what has been written

The Structure of a Report

A typical report structure will be as follows

Title

At the top of your report show who the report is to, who it is from, the date and a heading.

Introduction

Showing what information was requested, the work done and where results and conclusions can be found.

Analysis

Presenting the information required in a series of sub-sections. Use an underlined heading for each sub section.

Conclusion

Including, where appropriate, recommendations. Keep this brief. Never introduce new material into a conclusion.

Appendices

Containing detailed calculations, tables of underlying data, etc. If you use appendices refer to them in your report.

Numbered headings and cross referencing between sections make reports easier to follow (or navigate).

Presenting information

We will be looking at different ways how information can be presented through the use of tables, charts and graphs. Scatter graphs will be described in detail when discussing forecasting methods later on in the course notes.

Tables

Tabulation is the process of presenting data in the form of a table – an arrangement of rows and columns.

The purpose of tabulation is to summarise the information and present it in a more understandable way.

1. Rules of Tabulation

1. Title: the table must have a clear and self-explanatory title.
2. Source: the source of the material used in drawing up the table should be stated (usually by way of a footnote).
3. Units: the units of measurement that have been used must be stated.

- 4. Headings: all column and row headings should be clear and concise.
- 5. Totals: these should be shown where appropriate, and also any subtotals that may be applicable to the calculations.
- 6. Percentages and ratios: these are sometimes called derived statistics and should be shown, if meaningful, with an indication of how they were calculated.
- 7. Column layout: for ease of comparison columns containing related information should be adjacent and derived figures should be adjacent to the column to which they refer.
- 8. Simplicity: the table should be as concise as possible.
- 9. Layout: wherever possible ensure that the table is set up so that there is no need to turn the page. This will affect the choice of columns and rows.

2. **Charts and Graphs**

Clarity of presentation of information can be further improved if data is presented in the form of charts or graphs (diagrams).

The following are the principal types of diagrams:

- Bar charts
- Line graphs
- Pie charts
- Scatter graphs

Bar Charts

A bar chart is a widely used method of illustrating quantitative data. Quantities are shown in the form of bars on a chart, the length of the bars being proportional to the quantities.

1. Simple bar charts

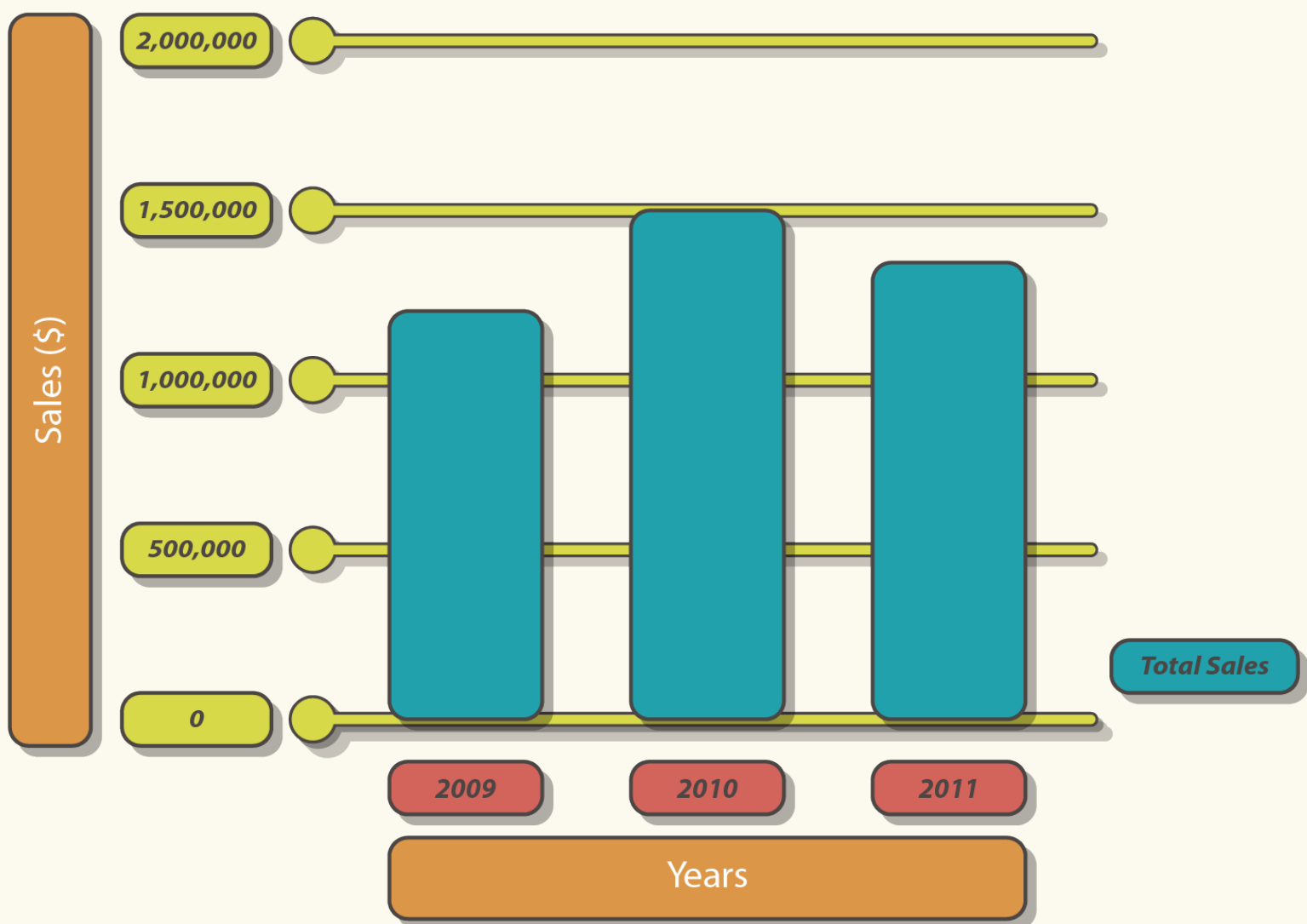
A simple bar chart consists of one or more bars, in which the length of each bar indicates the size of the corresponding information.

ABC Ltd: Sales Figures

	a(\$)	b(\$)	c(\$)	total(\$)
--	--------------	--------------	--------------	------------------

2009	300000	400000	500000	1200000
2010	400000	500000	600000	1500000
2011	300000	600000	400000	1300000

ABC LTD DIVISIONAL SALES 2009 - 2011

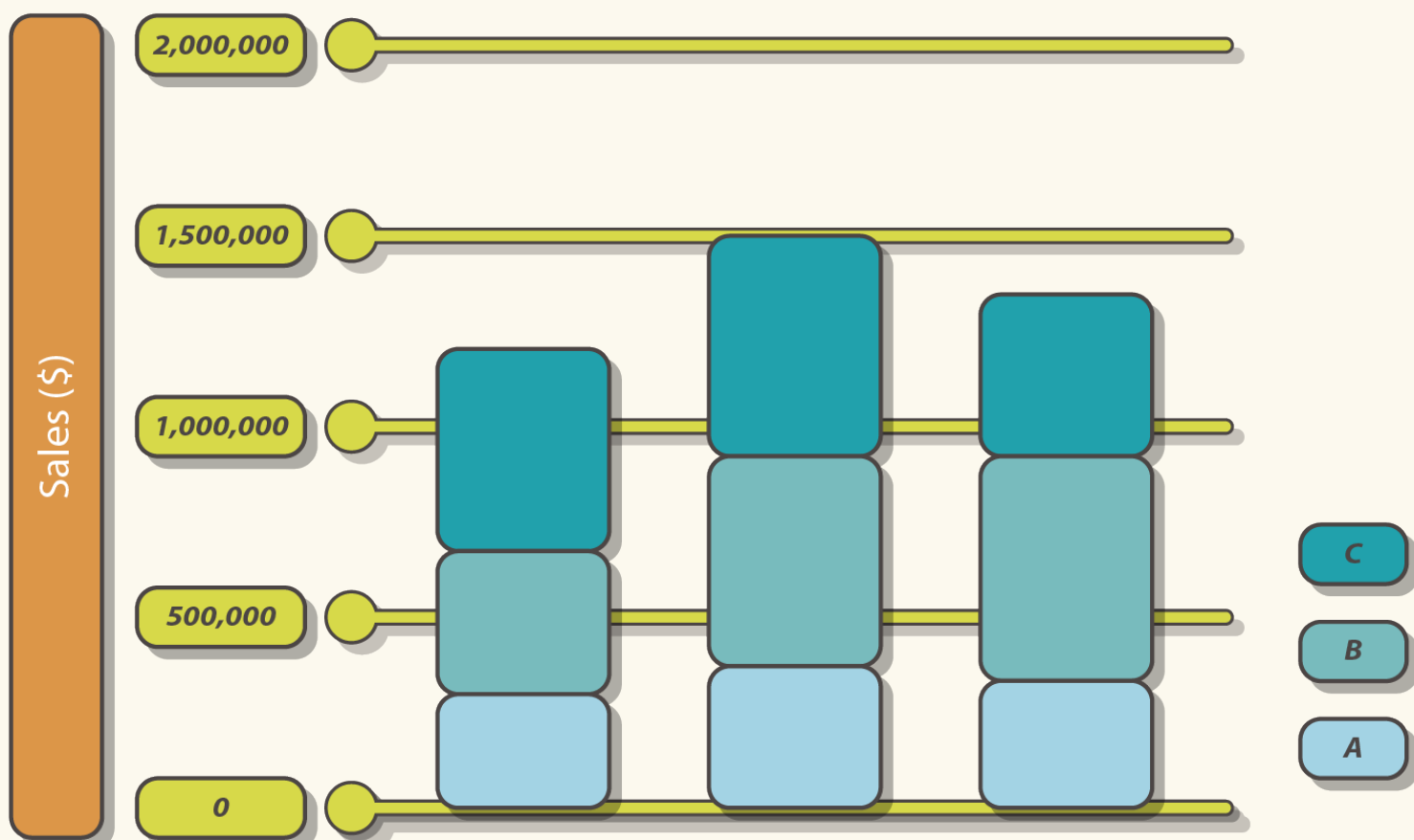


A component bar chart is used when each total figure in the data is made up of a number of different components and it is important that these component elements are shown as well as the total figure.

ABC Ltd: Sales Figures

	a(\$)	b(\$)	c(\$)	total(\$)
2009	300000	400000	500000	1200000
2010	400000	500000	600000	1500000
2011	300000	600000	400000	1300000

ABC LTD DIVISIONAL SALES 2009 - 2011



2009

2010

2011

Years

aCOWtancy.com

3. Percentage component bar chart

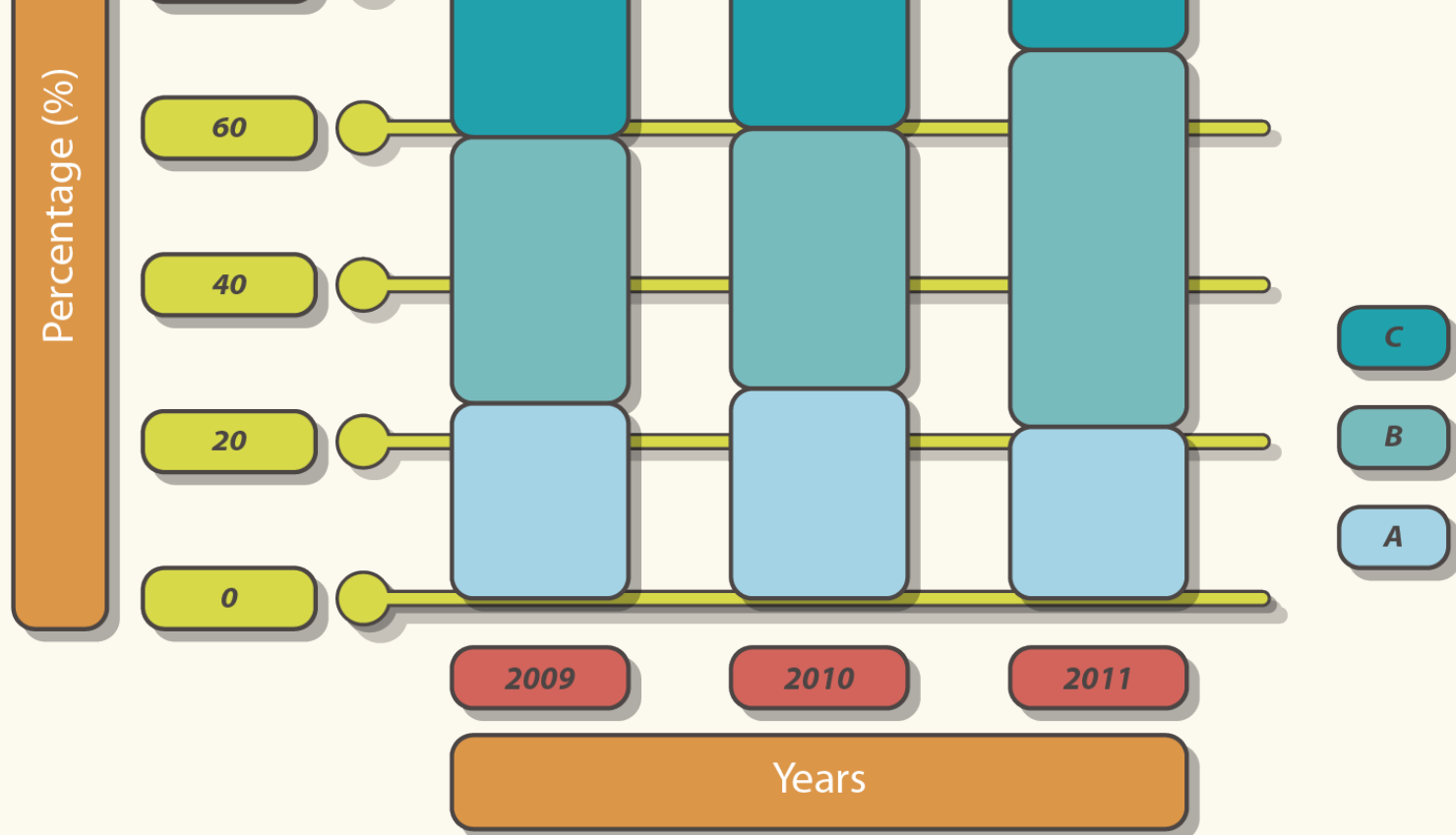
ABC Ltd: Sales Figures

	division a	division b	division c	total
2009	\$300000 25%	\$400000 33.33%	\$500000 41.67%	\$1200000
2010	\$400000 27%	\$500000 33%	\$600000 40%	\$1500000
2011	\$300000 23%	\$600000 46%	\$400000 31%	\$1300000

**ABC LTD DIVISIONAL SALES
2009 - 2011**

100

80



4. Compound (multiple) bar charts

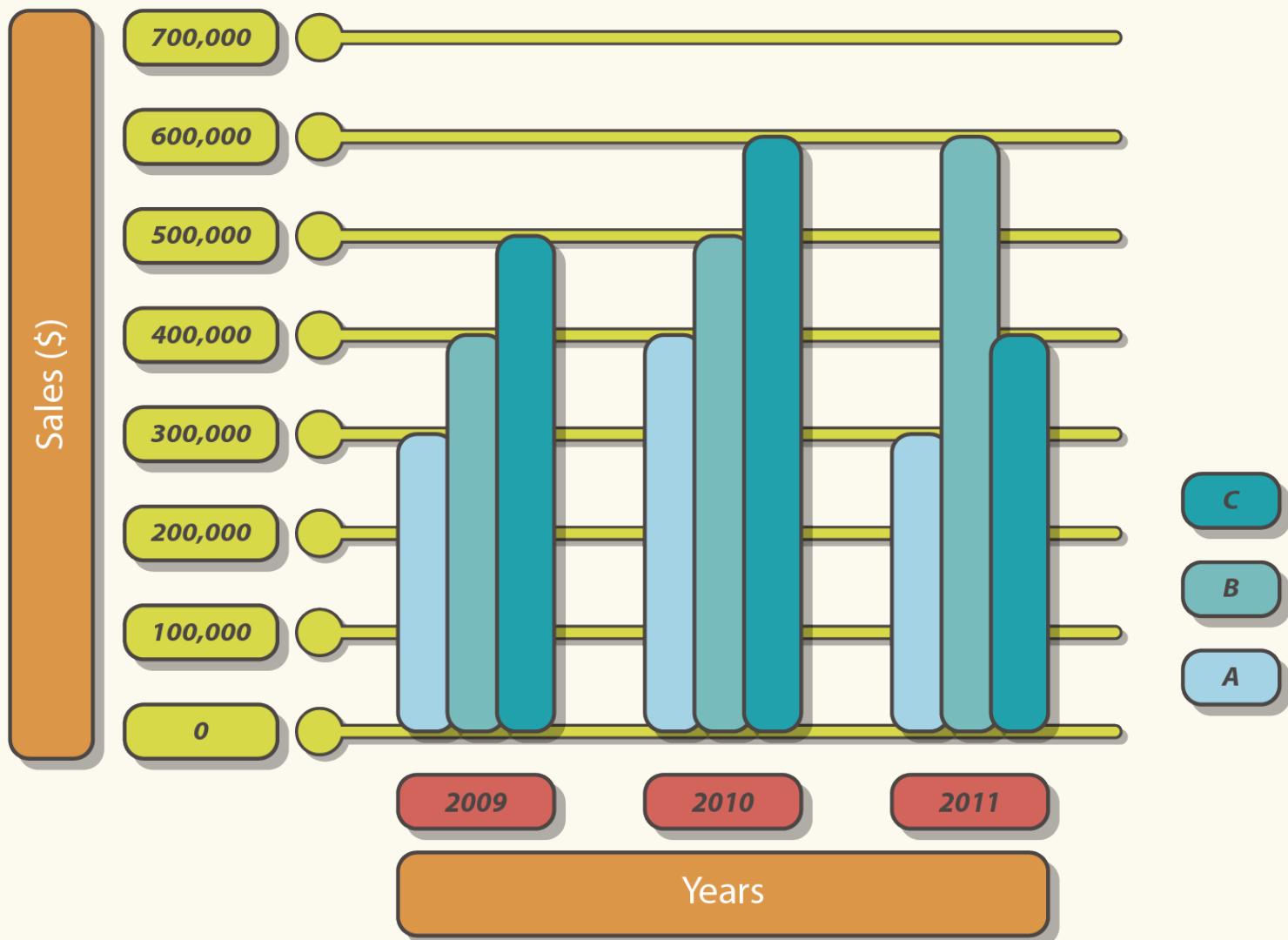
Compound bar charts are sometimes termed multiple bar charts. A compound bar chart is one where there is more than one bar for each sub-division of the chart. For example if the sales per product for each year are given then for each year there could be a separate bar for each product.

This has obvious similarities to a component bar chart where each component of the total was shown as part of the total bar. However the difference here is that each component has its own bar and is not stacked. It is a suitable format if the total of each component of the bar chart has no significance.

ABC Ltd: Sales Figures

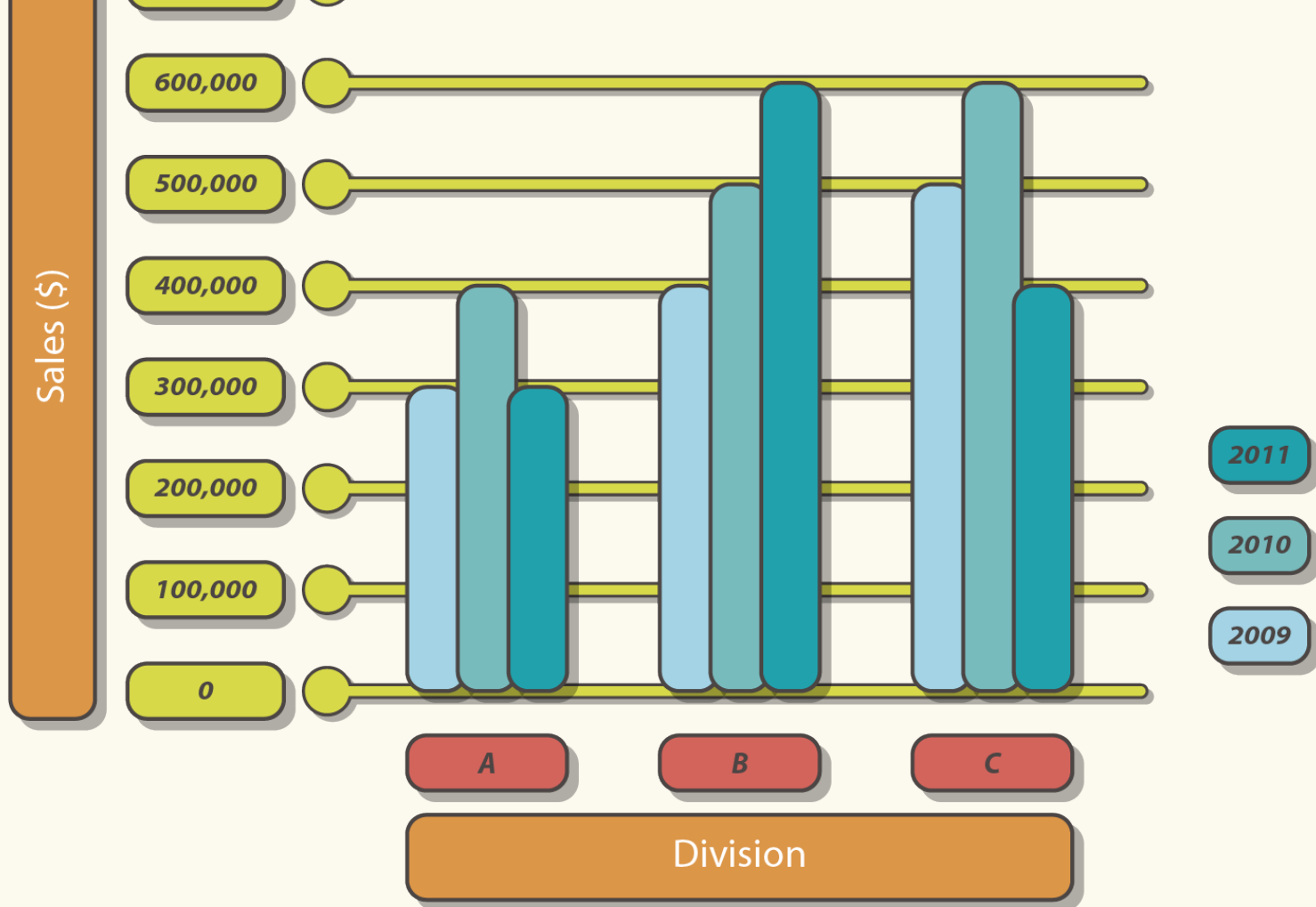
	division a	division b	division c	total
2009	\$300000	\$400000	\$500000	\$1200000
2010	\$400000	\$500000	\$600000	\$1500000
2011	\$300000	\$600000	\$400000	\$1300000

ABC LTD DIVISIONAL SALES 2009 - 2011



ABC LTD DIVISIONAL SALES 2009 - 2011





Graphs

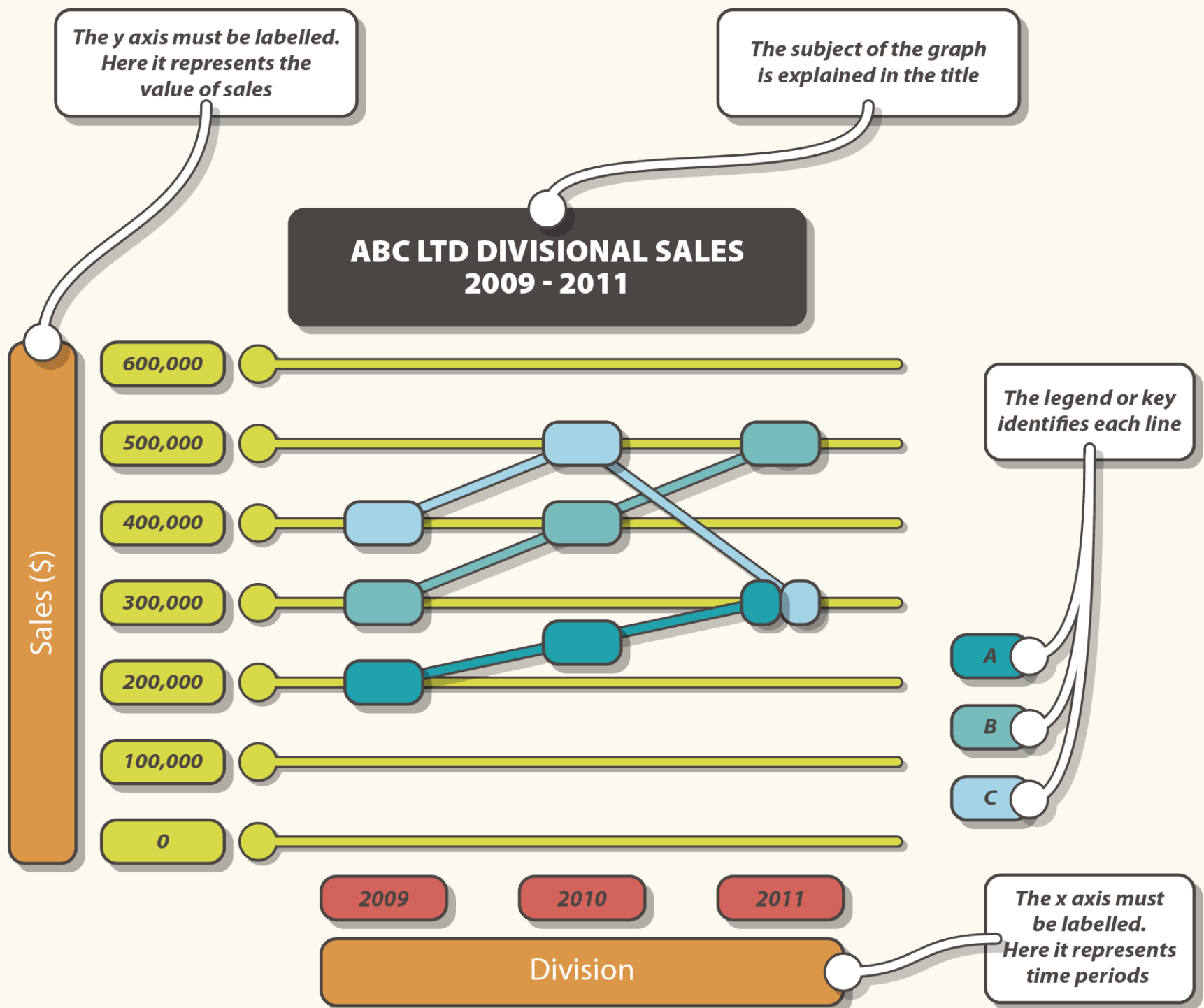
1. Simple line graphs

In many instances data can be more clearly and understandably presented in the form of a line graph. The x axis would represent the independent variable whereas the y axis represent the dependent variable.

2. Multiple line graphs

You may be required to plot more than one set of variables on the same graph.

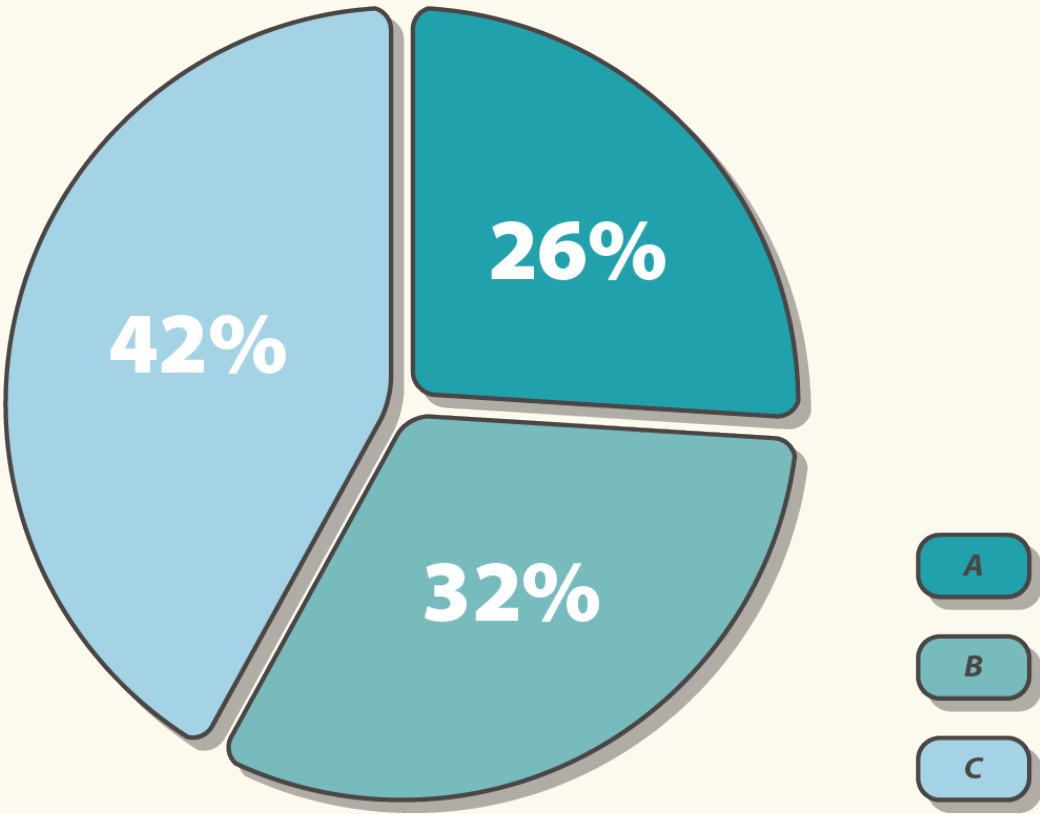
If more than one line is to appear on a graph then they must also be drawn to the same scale and the different line should be clearly indicated by use of a key (e.g. continuous line, broken line, dotted line) or different colour.



Pie Charts

A pie chart is a circular chart divided into sectors, illustrating proportion. In a pie chart, the arc length of each sector (and consequently its central angle and area), is proportional to the quantity it represents. Together, the sectors create a full disk.

ABC LTD DIVISIONAL SALES
2011



	division a	division b	division c	total
2011	\$400000	\$500000	\$650000	\$1550000
	26%	44%	30%	

To calculate segment angle:

Value of segment x 360° / Value of total

Division A: $400,000 / 1,550,000 \times 360 = 93.6^\circ$

Division B: $500,000 / 1,550,000 \times 360 = 116.1^\circ$

Division C: $650,000 / 1,550,000 \times 360 = 151.2^\circ$

Pie charts can be an effective way of displaying information in some cases, especially if the aim is to compare the size of a slice with the whole pie. They work particularly well when the slices represent 25 to 50% of the data, but in general, other charts such as the bar chart or non-graphical methods such as tables, may be more adapted for representing certain information. In fact, it may be difficult to compare different sections of a given pie chart, or to compare data across pie charts.

Interpret information

Cost Accounting Techniques

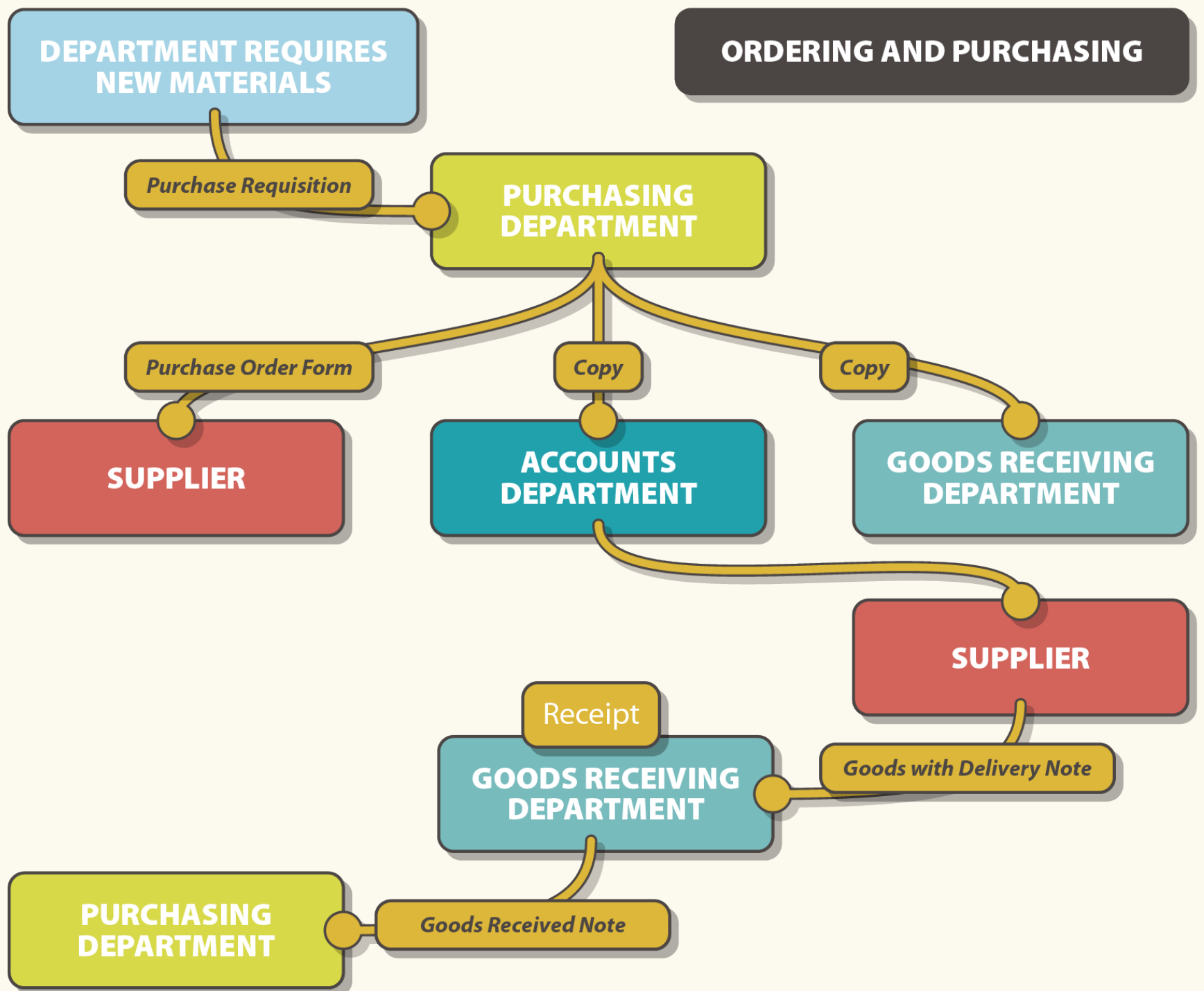
Accounting for Material, Labour and Overheads

Ordering, receiving and issuing of materials

Ordering, receiving and issuing of materials

Every movement of a material in a business should be documented using the following as appropriate:

1. Purchase requisition
2. purchase order
3. GRN
4. materials requisition note
5. materials transfer note and
6. materials returned note



Procedures for ordering, purchasing and receiving materials

Proper records must be kept of the physical procedures for ordering and receiving a consignment of materials to ensure that:

enough inventory is held

there is no duplication of ordering

quality is maintained

there is adequate record keeping for accounts purposes

The procedures for ordering, purchasing and receiving materials include

Documents for ordering, purchasing and receiving materials

1. Purchase requisition

Current inventories run down to the level where a reorder is required.

The stores department issues a purchase requisition which is sent to the purchasing department, authorising the department to order further inventory.

2. Purchase order

The purchasing department draws up a purchase order which is sent to the supplier.

Copies of the purchase order must be sent to the accounts department and the storekeeper (or goods receiving department).

3. Quotation

The purchasing department may have to obtain a number of quotations if a new inventory line is required, the existing supplier's costs are too high or the existing supplier no longer stocks the goods needed.

4. Delivery note

The supplier delivers the consignment of materials, and the storekeeper signs a delivery note for the carrier.

The packages must then be checked against the copy of the purchase order, to ensure that the supplier has delivered the types and quantities of materials which were ordered.

5. Goods received note

If the delivery is acceptable, the storekeeper prepares a goods received note (GRN).

A copy of the GRN is sent to the accounts department, where it is matched with the copy of the purchase order.

The supplier's invoice is checked against the purchase order and GRN, and the necessary steps are taken to pay the supplier.

Documents for issuing inventory

1. **Materials requisition note**

Materials can only be issued to production departments against a materials requisition.

This document must record not only the quantity of goods issued, but also the cost centre or the job number for which the requisition is being made.

The materials requisition note may also have a column, to be filled in by the cost department, for recording the cost or value of the materials issued to the cost centre or job.

2. **Materials returned note**

This is used to record any unused materials which are returned to stores.

3. **Materials transfer note**

This document is used to transfer materials from one production department to another.

Monitor physical and 'book' inventory

Perpetual Inventory

Perpetual inventory is the recording as they occur of receipts, issues and the resulting balances of individual items of inventory in both quantity and value. These inventory records are updated using stores ledger cards and bin cards.

	BIN CARD			
COMMODITY				
PACKAGING SIZE				
DATE	RECEIPT / ISSUE	RECEIVED	ISSUED	BALANCE

ISSUE

Voucher No.

Stocktaking

The process of stocktaking involves checking the physical quantity of inventory held on a certain date with the balance on the stores ledger cards or bin cards.

Stocktaking can be carried out either on a periodic basis or continuous basis.

1. Periodic stocktaking

Periodic stocktaking involves checking the balance of every item in inventory at a set point in time, usually at the end of an accounting year.

2. Continuous stocktaking

This involves counting and valuing selected items of inventory on a rotating basis. Each item is checked at least once a year.

Control procedures to minimize discrepancies and losses

Inventories cost a considerable amount of money and therefore, control procedures must be in place.

Such control procedures would include

1. physical security procedures, regular stocktaking and recording of all issues to eliminate unnecessary losses from inventory;

- 2. separation of ordering and purchasing activities to eliminate fictitious purchases
- 3. quotation for special order to reduce the probability of ordering goods at inflated prices.

Inventory losses arising from theft, pilferage or damage must be written off against profits as soon as they occur.

Material inventory acct

Material Inventory Account

Materials held in store are asset and are therefore recorded in the statement of financial position of a company.

Transactions relating to materials are recorded in the material inventory account.

material inventory a/c				
material purchased	100		issues to production wip a/c	94
materials returned to stores	5		materials returned to suppliers	3
			materials w/off - i/s	1
			production overhead account - indirect material	5
			closing inventory c/d	2

	-----			----
	105			105
	===			===
closing inventory b/d	2			

Costs of ordering and holding inventory

Holding Costs

A business holds inventory so that customer demands are met as soon as they arise. Buffer (safety) inventory is the minimum inventory level required to prevent stock-outs from occurring.

Advantages of Holding Stock

the need to meet customer demand

taking advantage of bulk discounts

reducing total annual re-ordering cost

Disadvantages of Holding Stock

storage costs

cost of capital tied up in stock

deterioration, obsolescence, and theft

Stock-out costs

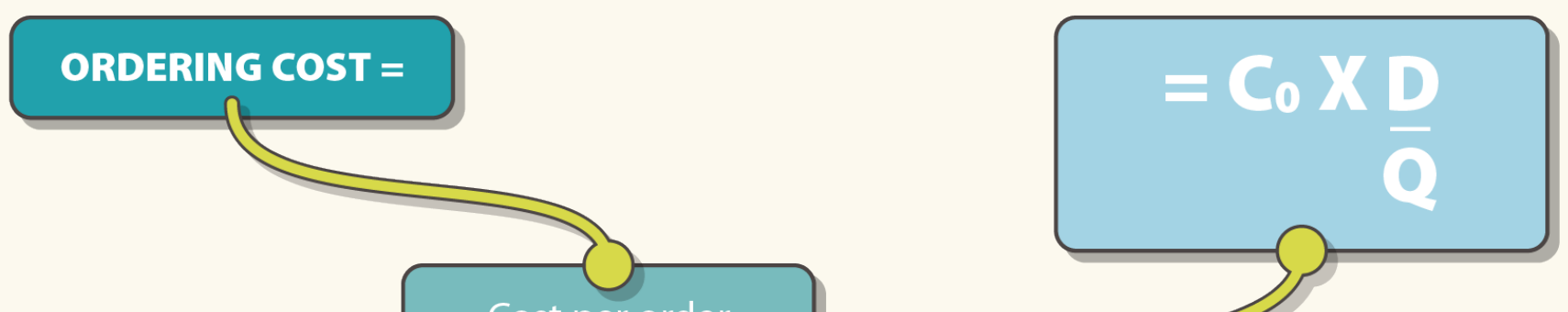
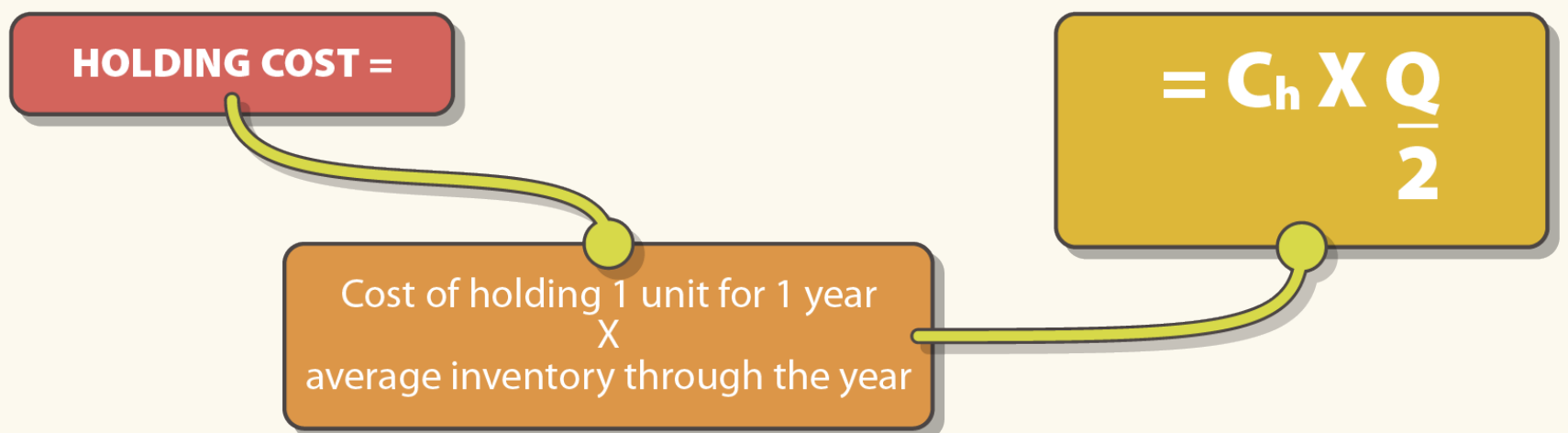
Stock-out costs occur when the business runs out of inventory and these include:

Loss of sales

Loss of customers

Loss of reputation

Reduced profits



Cost per order
X
number of orders pa

Ordering Costs

An order cost is incurred every time an order is placed to purchase materials. Therefore, an increase in the number of orders will cause a corresponding increase in ordering costs.

Where:

Q is the quantity per order

Optimal reorder quantities

Reorder quantity

This is the quantity of inventory which is to be ordered when inventory reaches the reorder level.

If the re-order quantity is set so as to minimise the total costs associated with holding and ordering inventory, then it is known as the economic order quantity.

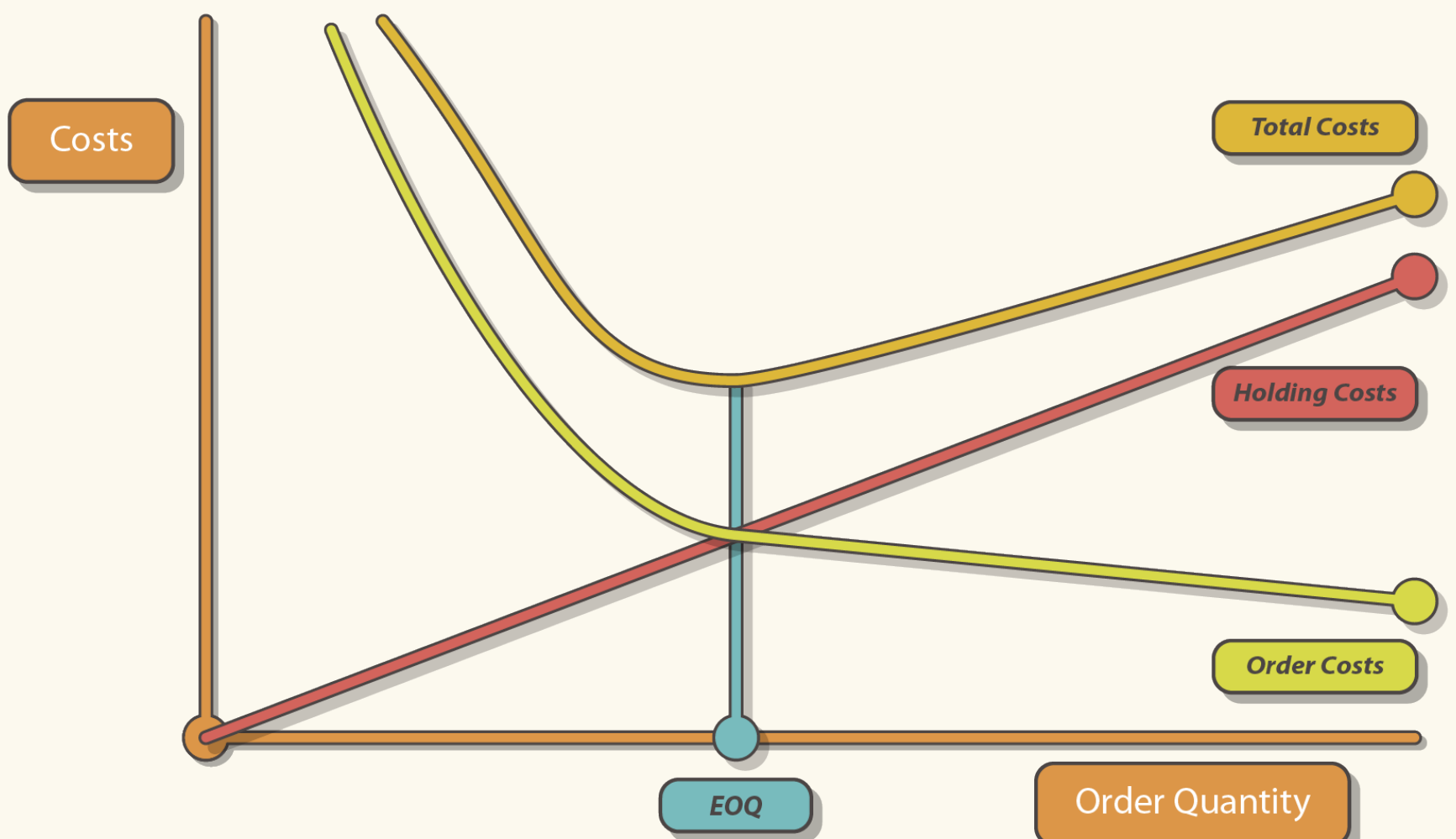
Economic order quantity (EOQ)

When determining how much to order at a time, an organisation will recognise that:

- as order quantity rises, average stock rises and the total annual cost of holding stock rises
- as order quantity rises, the number of orders decreases and the total annual re-order costs decrease.

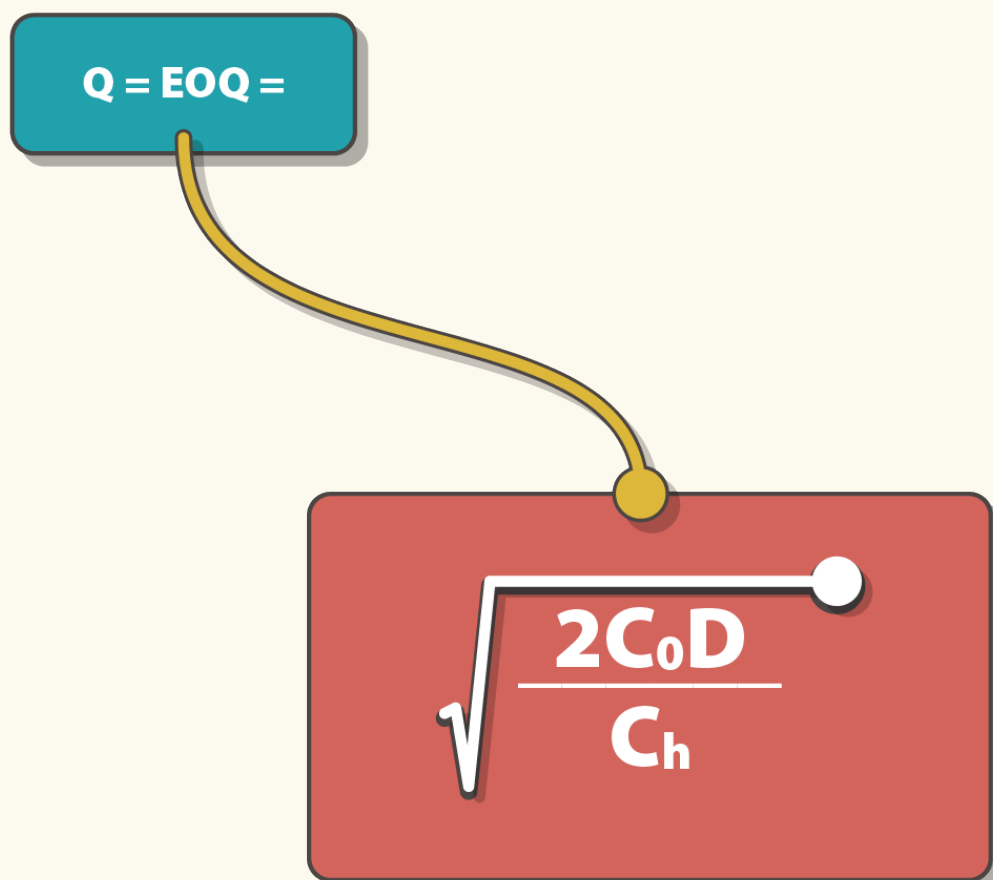
The economic order quantity (EOQ) is the order quantity which minimises the total costs associated with holding and ordering stock.

At this quantity, holding costs are equal to ordering costs.



EOQ formula

The formula for the EOQ will be provided in your examination.



A diagram illustrating the EOQ formula. A teal box at the top contains the text $Q = \text{EOQ} =$. A yellow curved line connects this box to a red box below it. The red box contains the formula $\sqrt{\frac{2C_oD}{C_h}}$, with a white dot at the end of the line pointing to the opening of the square root symbol.

$$Q = \text{EOQ} = \sqrt{\frac{2C_oD}{C_h}}$$

Where:

Ch = cost of holding one unit of inventory for one time period

C0 = cost of ordering a consignment from a supplier

D = demand during the time period

Q = the reorder quantity (EOQ)

EOQ – The assumptions made

The EOQ formula is based on certain assumptions, including

constant purchase price

constant demand and constant lead-time

holding-cost dependent on average stock

order costs independent of order quantity

Total Annual Costs

Total Annual Costs (TAC) = purchasing costs + holding costs + ordering costs

TAC =

$$DP + C_o \frac{D}{Q} + C_h \frac{Q}{2}$$

Where: -

D= demand during the time period

P = purchase price per unit

Ch = cost of holding one unit of inventory for one time period

C0 = cost of ordering a consignment from a supplier

Q = the reorder quantity (EOQ)

This formula is not given in the exam

Optimal reorder quantities with discounts

Optimal reorder quantities with discounts

When bulk orders are placed, it is often possible to negotiate a quantity discount on the purchase price.

Although the purchase price and annual ordering cost will decrease, the annual holding cost will increase.

Should the discount be accepted?

Steps involved in calculating the EOQ when discounts are available

1. Calculate EOQ - ignore all discounts.
2. If the EOQ is smaller than the minimum purchase quantity to obtain a bulk discount, calculate the total cost for the EOQ.
3. Recalculate the annual total annual costs for a purchase order size that is only just large enough to qualify for the bulk discount.
4. Compare the costs derived from steps (2) and (3). Select the minimum cost alternative.
5. If there is a further discount available for an even larger order size, repeat the same calculations for the higher discount level.

Minimise inventory costs

Economic Batch Quantity

Some organizations replenish inventory levels gradually by manufacturing their own products internally.

They need to decide whether to produce large batches at long intervals or produce small batches at short intervals.

In order to decide which course of action to take, an Economic Batch Quantity (EBQ) model is used.

The maximum inventory level will never be as great as the batch size, because some of the batch will be used up while the remainder is being produced.

Whereas in the EOQ calculation, we were interested in determining the size of an order, in EBQ, we are concerned with determining the number of items to be produced in a batch.

$$EBQ = \sqrt{\frac{2 C_0 D}{C_h (1 - \frac{D}{R})}}$$

Where: -

Q = the batch size

Q = the batch size

D = demand during the time period

Ch = cost of holding one unit of inventory for one time period

C0 = cost of setting up a batch ready to be produced

R = annual replenishment rate

The formula for the EBQ will be provided in your examination.

However, this formula is not given

AVERAGE INVENTORY =

$$\frac{EBQ}{2} \left(1 - \frac{D}{R}\right)$$

Reorder level

When inventories reach the reorder level, an order should be placed to replenish inventories.

The reorder level is determined by consideration of the following.

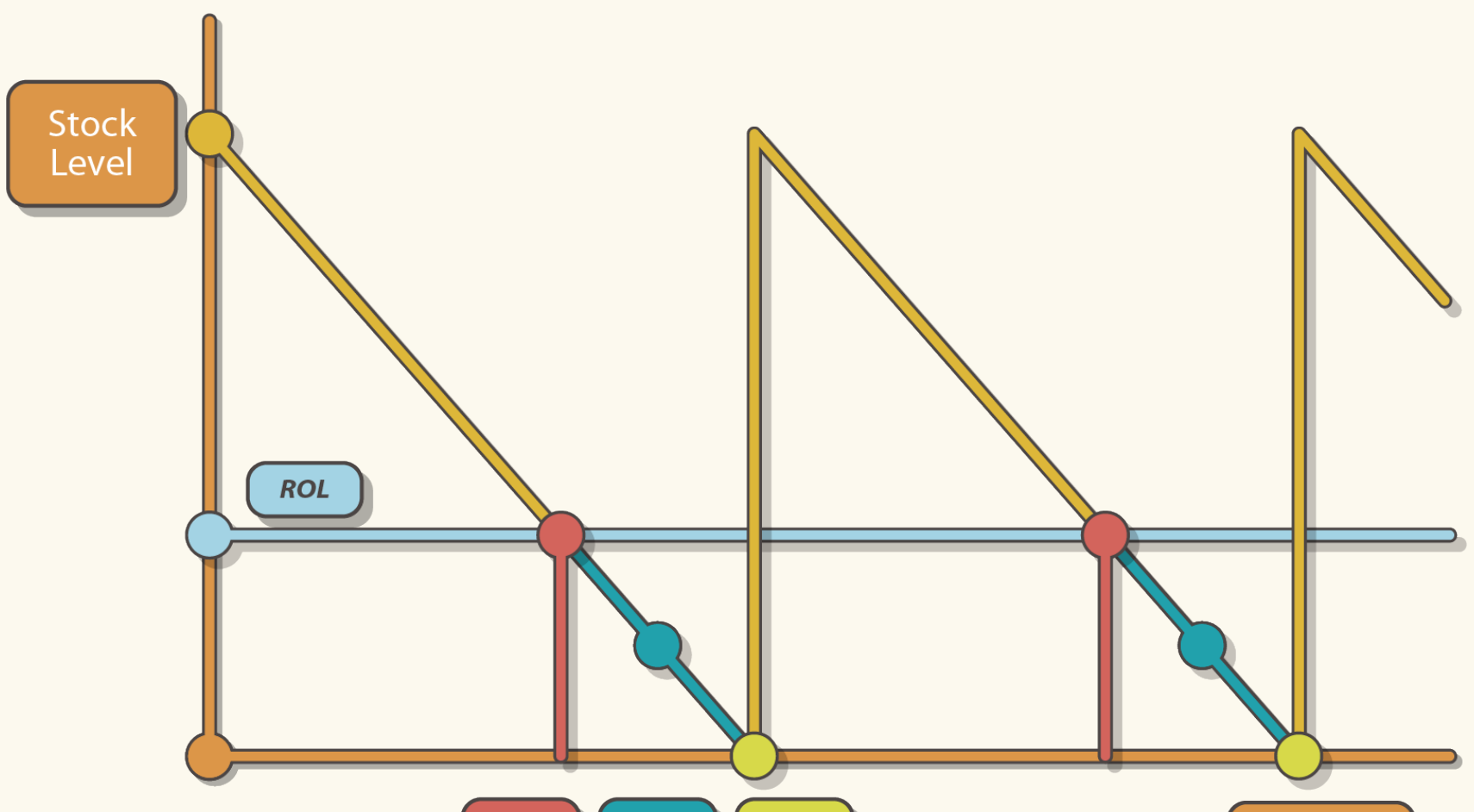
- The maximum rate of consumption
- The maximum lead time

The maximum lead time is the time between placing an order with a supplier, and that order arriving.

When the reorder level is reached, the quantity of inventory to be ordered is known at the reorder quantity (EOQ).

When demand in the lead time is constant,

Reorder level = maximum usage × maximum lead time



Order
Placed

Lead
Time

Order
Arrives

Time

Minimum level

This is a warning level to draw management's attention to the fact that inventories are approaching a dangerously low level and that stock outs are possible.

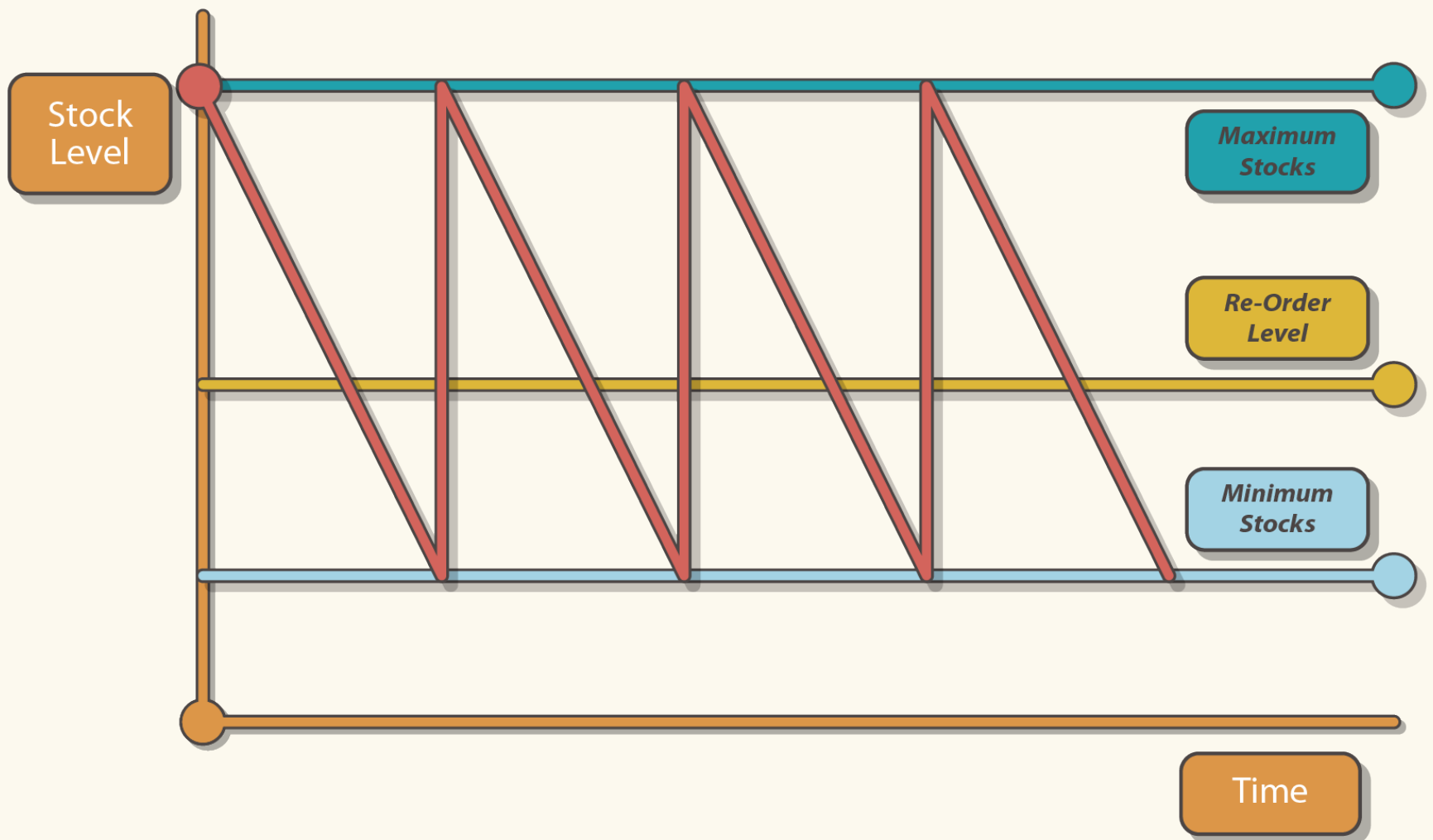
Minimum level = reorder level – (average usage × average lead time)

Maximum level

This also acts as a warning level to signal to management that inventories are reaching a potentially wasteful level.

Maximum level = reorder level + reorder quantity – (minimum usage × minimum lead time)

Average inventory



The average inventory formula assumes that inventory levels fluctuate evenly between the minimum (or safety) inventory level and the highest possible inventory level, i.e. the amount of inventory immediately after an order is received (safety inventory + reorder quantity).

Average inventory = safety inventory + $\frac{1}{2}$ reorder quantity

LIFO, FIFO and average methods

LIFO, FIFO and average methods

The value of closing inventory and material issues

In management accounting, there are various methods to value closing inventory and issues from stores.

The three main inventory valuation methods are

1. FIFO – materials are issued out of stock in the order in which they were delivered into inventory, i.e. issues are priced at the cost of the earliest delivery remaining in inventory.

This is a logical pricing method but can be cumbersome to operate since each batch of material has to be identified separately

2. LIFO – the last items of material received are the first items to be issued. LIFO is not accepted for financial accounting purposes (IAS 2).

The items remaining in inventory are the first which were produced or purchased.

3. Cumulative Weighted average cost – AVCO calculates a weighted average price for all units in inventory.

Issues are priced at this average cost, and the balance of inventory remaining would have the same unit valuation.

A new weighted average price is calculated whenever a new delivery of materials into store is received.

Hence, fluctuations in prices are smoothed out, making it easier to use the data for decision making.

How do we calculate the PERIODIC weighted average cost?

This method is only used if specifically mentioned in the exam question. Otherwise, the cumulative weighted average method should be used.

Periodic weighted average =

cost of opening inventory + total costs of receipts

received

units of opening inventory + total units

Direct and indirect costs of labour

Direct Labour Costs

Direct labour costs include the basic pay of direct workers.

Direct workers are those employees who are directly involved in making the products.

Therefore, they are part of the prime cost of a product.

Indirect Labour Costs

Indirect labour costs include the basic pay of indirect workers, i.e. those employees who are not directly involved in making the product, e.g. factory supervisor, maintenance staff.

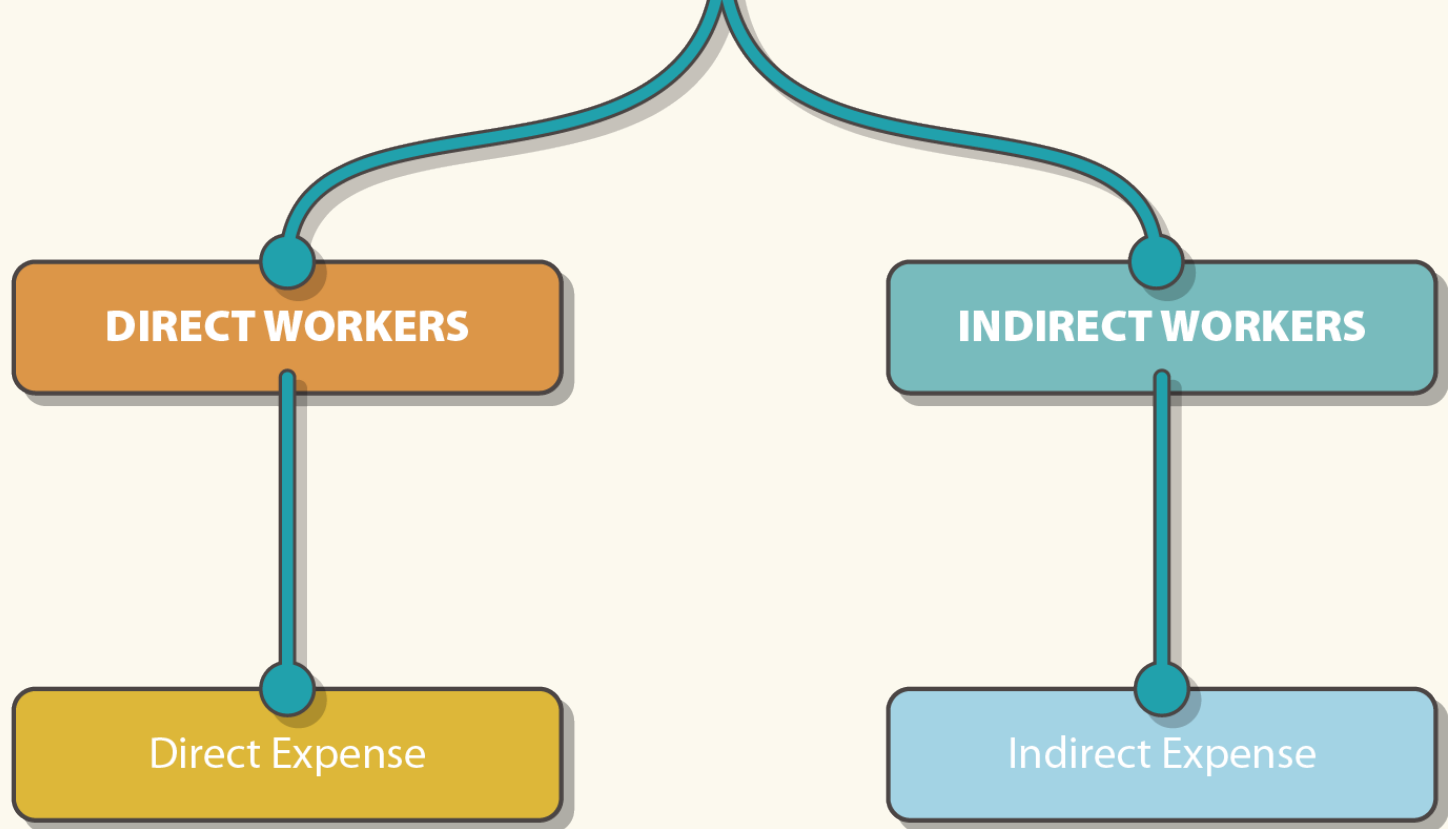
These costs are part of the overhead cost.

Indirect labour costs also include: -

1. bonus payments
2. employers' NI contributions
3. idle time – it occurs when employees cannot get on with their work, through no fault of their own, e.g. machines break down or there is shortage of work
4. sick pay
5. time spent by direct workers doing 'indirect jobs' e.g. cleaning the offices or repairing machines.



NORMAL HOURS

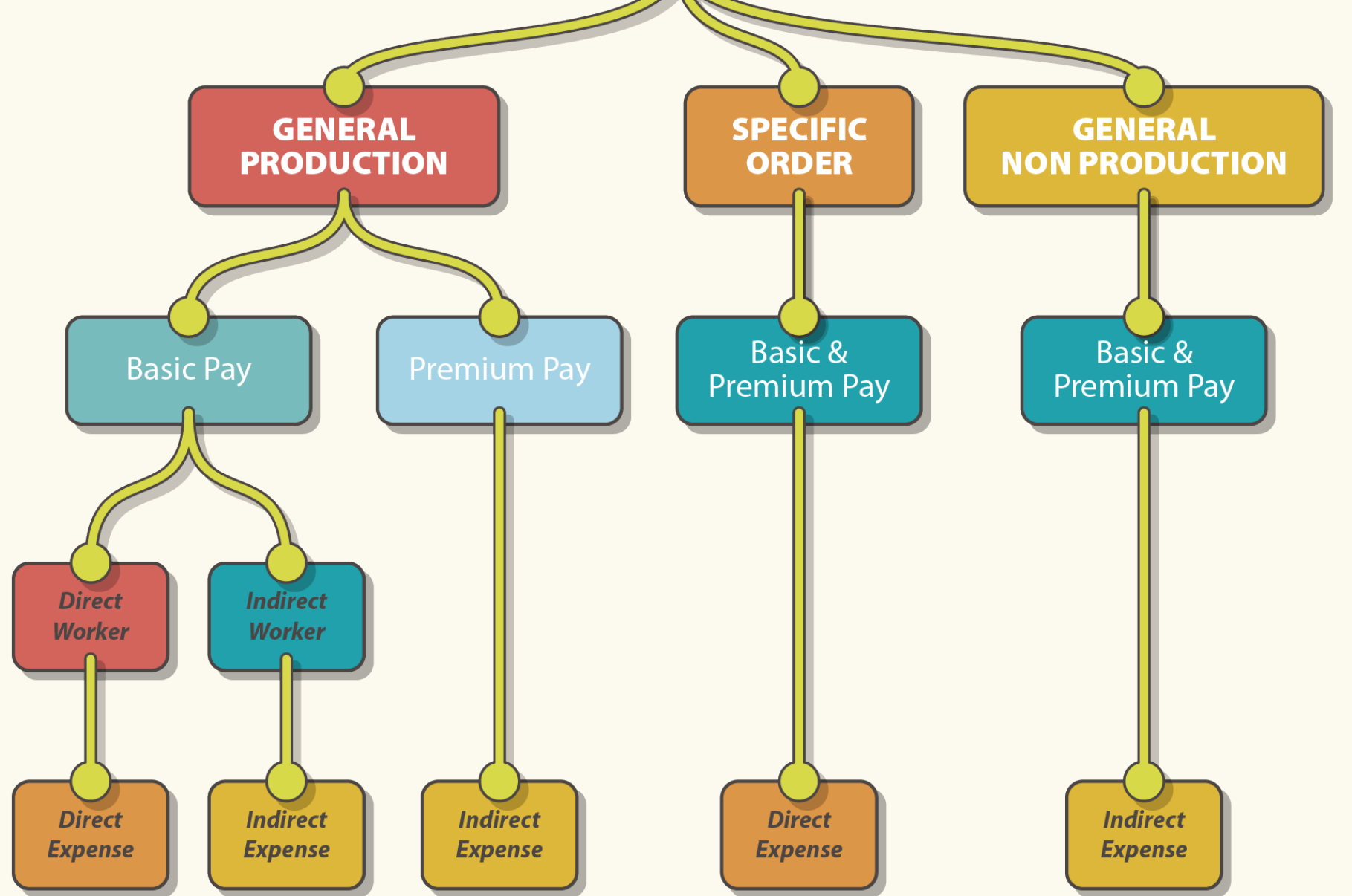


Overtime and overtime premiums

When employees work overtime, they will receive a basic pay + an overtime premium.

Is the overtime premium a direct or indirect cost?

OVERTIME PREMIUM



Shift allowances or shift premiums are similar to overtime premiums and are treated as an indirect labour cost.

Labour costs to work done

Labour costs to work done

Methods used to relate input labour costs to work done

Different methods can be used to determine the time spent doing jobs.

These include time sheets (activity time records), time cards (clock cards) and job sheets.

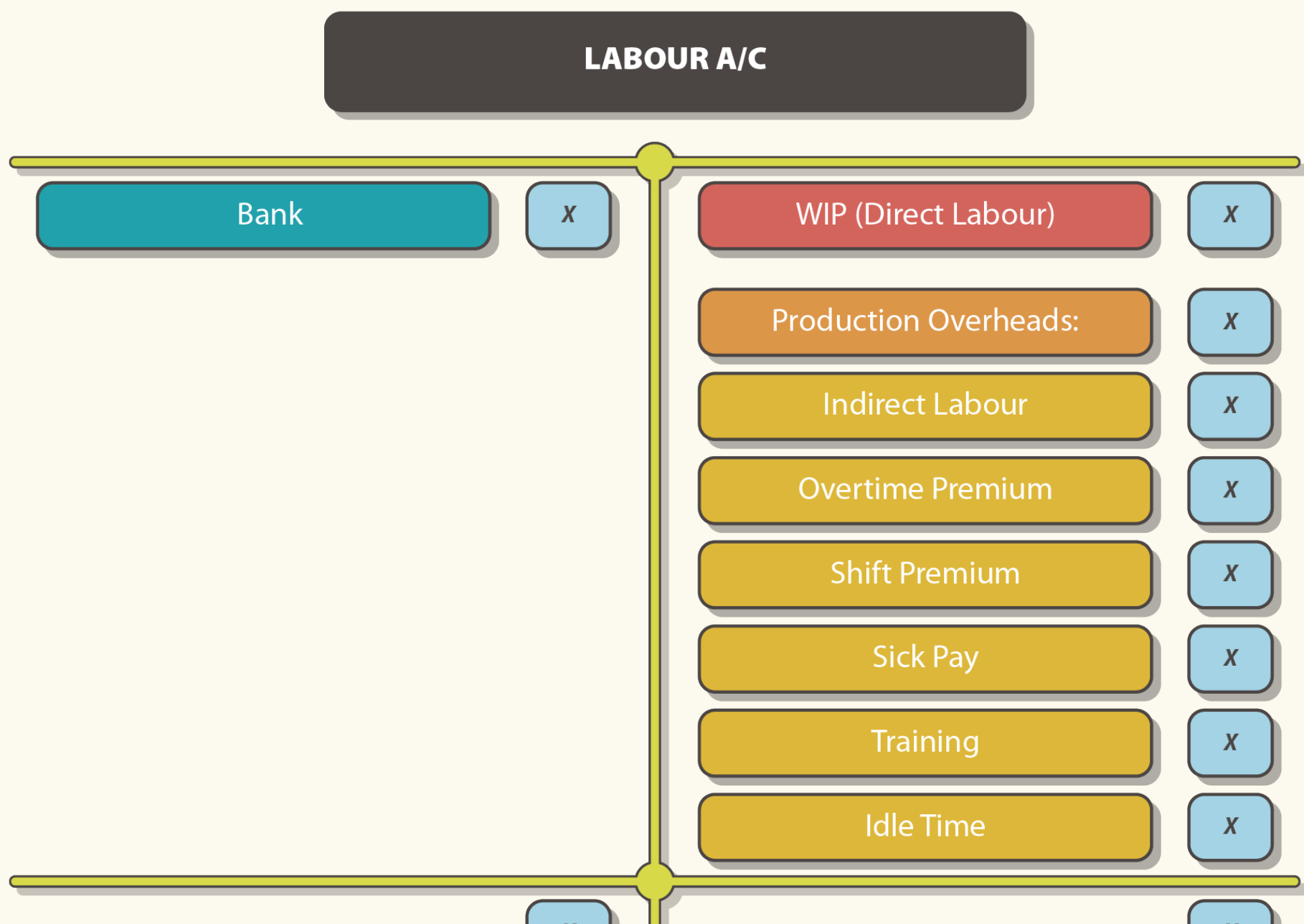
These methods are required to determine the costs to be charged to specific jobs.

The payroll department carries out functions that relate input labour costs to the work done.

It calculates the gross wages from time and activity records and makes the required deductions, e.g. NI contributions and PAYE.

Labour cost inputs and outputs

Accounting transactions relating to labour are recorded in the labour account



Therefore,

1. When gross wages are paid (gross = net pay + National Insurance + PAYE) to employees, they are accounted for as

Dr Labour A/c

Cr Bank A/c

2. When labour is used within a particular production process, the direct labour costs are transferred from the labour account using

Dr Work in progress A/c

Cr Labour A/c

3. Indirect labour costs are transferred from the labour account to be grouped with other indirect costs using

Dr Production overhead A/c

Cr Labour A/c

Idle time ratio

The idle time ratio shows the proportion of available hours which were lost as a result of idle time

Idle time ratio =

Idle hours x 100 %

Total hours

Remuneration methods

Remuneration methods

Labour remuneration methods have an effect on:

1. The cost of finished products and services.
2. The morale and efficiency of employees.

There are two basic methods:

1. Time-based systems
2. Piecework systems

Time-based systems

Employees are paid a basic rate per hour, day, week or month.

Total Wages = (hours worked x basic rate of pay per hour) + (overtime hours worked x overtime premium per hour)

Basic time-based systems do not provide an incentive for employees to improve productivity / efficiency. Therefore, close supervision is necessary.

Piecework systems

A piecework system pays a fixed amount per unit produced.

Total wages = units produced x rate of pay per unit

There are two main piecework systems

1. **Straight piecework systems**

– these are almost extinct. Today, it is normal for pieceworkers to be offered a guaranteed minimum wage, so that they do not suffer loss of earnings when production is low through no fault of their own.

2. **Differential piecework systems**

– these systems involve different piece rates for different levels of production.

They offer an incentive to employees to increase their output by paying higher rates for increased levels of production. For example:

- up to 80 units per week, rate of pay per unit = \$1.00
- 80 to 90 units per week, rate of pay per unit = \$1.20
- above 90 units per week, rate of pay per unit = \$1.30

If an employee makes several different types of product, it may not be possible to add up the units for payment purposes.

Instead, a standard time allowance is given for each unit to arrive at a total of piecework hours for payment.

Incentive (bonus) schemes can also be in place which pay a basic time rate, plus a portion of the time saved as compared to some agreed allowed time.

Incentive (bonus) schemes characteristics

The characteristics of such schemes are as follows

1. Employees are paid more for their efficiency.
2. The profits arising from productivity improvements are shared between employer and employee.
3. Morale of employees is likely to improve since they are seen to receive extra reward for extra effort.

There are two schemes

1. Halsey – the employee receives 50% of the time saved

$$\text{Bonus} = \frac{\text{Time allowed} - \text{Time taken}}{2} \times \text{Time rate}$$

2. Rowan – the proportion paid to the employee is based on the ratio of time taken to time allowed

$$\text{Bonus} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time rate} \times \text{Time saved}$$

Individual vs. group bonus schemes

An individual bonus scheme is a remuneration scheme whereby individual employees qualify for a bonus on top of their basic wage, with each person's bonus being calculated separately.

Hence, the bonus is unique to the individual and it gets higher if efficiency is improved.

A group bonus scheme is related to the output performance of an entire group of workers, a department or even the whole factory. It increases co-operation between team members and is easier to administer.

Profit sharing schemes

A profit sharing scheme is a scheme in which employees receive a certain proportion of their company's year-end profits (the size of their bonus being related to their position in the company and the length of their employment to date).

Value added incentive schemes

These incentive schemes exclude any bought-in costs and are affected only by costs incurred internally such as labour.

Value added = sales – cost of bought-in materials and services.

For example, valued added should be treble the payroll costs and one third of any excess earned would be paid as a bonus.

Payroll costs	\$50,000
Value added target (x3)	\$150,000
Value added achieved	\$180,000
Excess value added	\$30,000
Employee's share	\$10,000

Labour turnovers

Labour turnovers

Level of Labour Turnover

Level of Labour Turnover

Labour turnover is the rate at which employees leave a company relative to the average number of people employed. This rate should be kept as low as possible.

Labour turnover =

Number of leavers who require replacement x 100%

Average number of employees

Causes of Labour Turnover

Some employees will leave their job and go to work for another company or organisation. Sometimes the reasons are unavoidable.

Illness or accidents

A family move away from the locality

Marriage, pregnancy or difficulties with child care provision

Retirement or death

However, some other causes can be avoidable. Example

Poor remuneration

Poor working conditions

Lack of promotion prospects

Bullying at the workplace

Costs of Labour Turnover

The costs of labour turnover can be large and management should attempt to keep labour turnover as low as possible so as to minimise these costs.

The cost of labour turnover may be divided into the following

Preventative costs

Replacement costs

Replacement costs

These are the costs incurred as a result of hiring new employees. These include

Cost of selection and placement

Inefficiency of new labour; productivity will be lower

Costs of training

Loss of output due to delay in new labour becoming available

Increased wastage and spoilage due to lack of expertise among new staff

The possibility of more frequent accidents at work

Cost of tool and machine breakage

Preventative costs

These are costs incurred in order to prevent employees leaving and they include

Cost of personnel administration incurred in maintaining good relationships and eliminating bullying in the workplace

Cost of medical services including check-ups, nursing staff and so on

Cost of welfare services, including sports facilities and canteen meals

Pension schemes providing security to employees

Investigate high labour turnover rates objectively

How can high labour turnover be reduced?

Paying satisfactory wages

Offering satisfactory hours and conditions of work

Creating a good informal relationship between employees

Offering good training schemes and career or promotion ladder

Improving the content of jobs to create job satisfaction

Proper planning so as to avoid redundancies

Investigating the cause of an apparently high labour turnover

Labour efficiency, capacity and production volume ratios

Labour efficiency, capacity and production volume ratios

Labour Efficiency Ratio

The labour efficiency ratio measures the performance of the workforce by comparing the actual time taken to do a job with the expected time.

Labour Efficiency Ratio =

$$\frac{\text{Expected hours to produce output}}{\text{Actual hours to produce output}} \times 100\%$$

Labour Capacity Ratio

The labour capacity ratio measures the number of hours spent actively working as a percentage of the total hours available for work.

Labour Capacity Ratio =

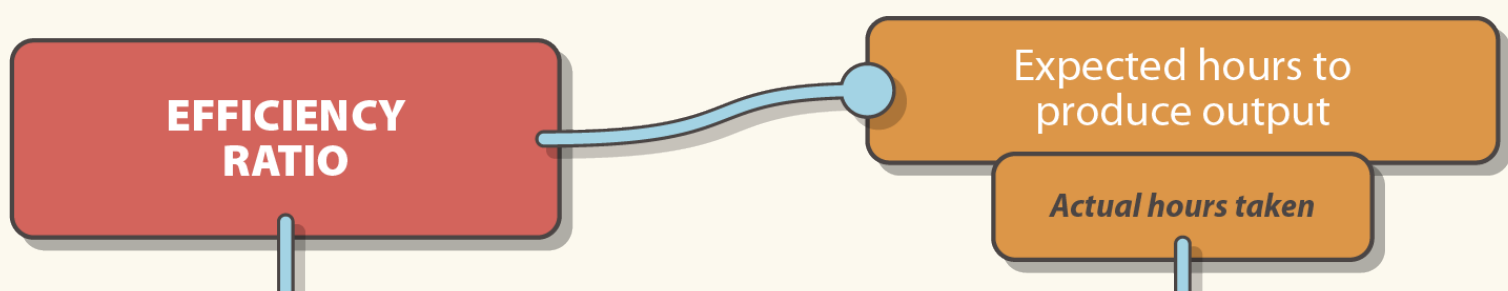
$$\frac{\text{Number of hours actively spent working}}{\text{Total hours available}} \times 100\%$$

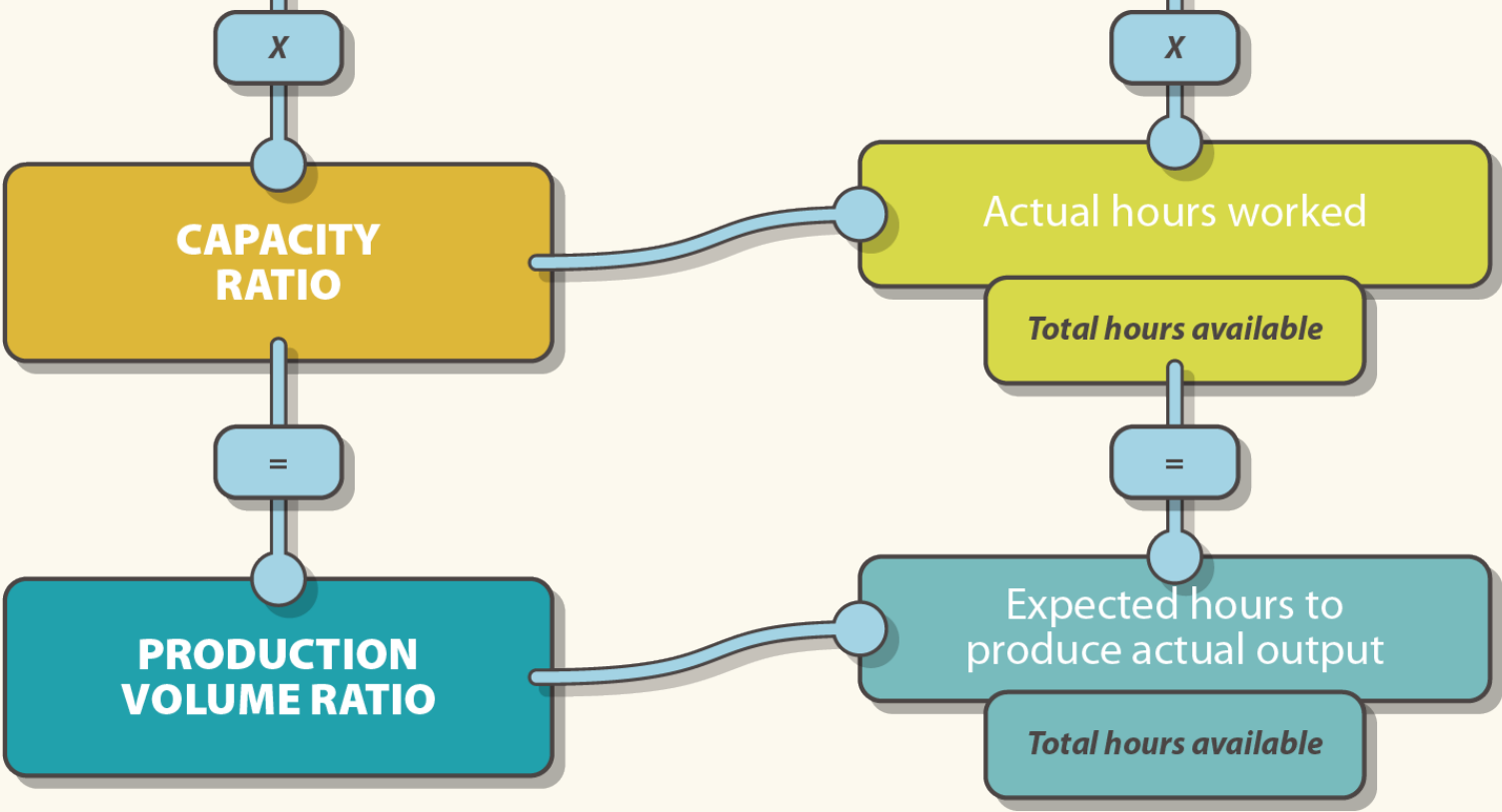
Labour Production Volume Ratio

The labour production volume ratio compares the number of hours expected to be worked to produce actual output with the total hours available for work.

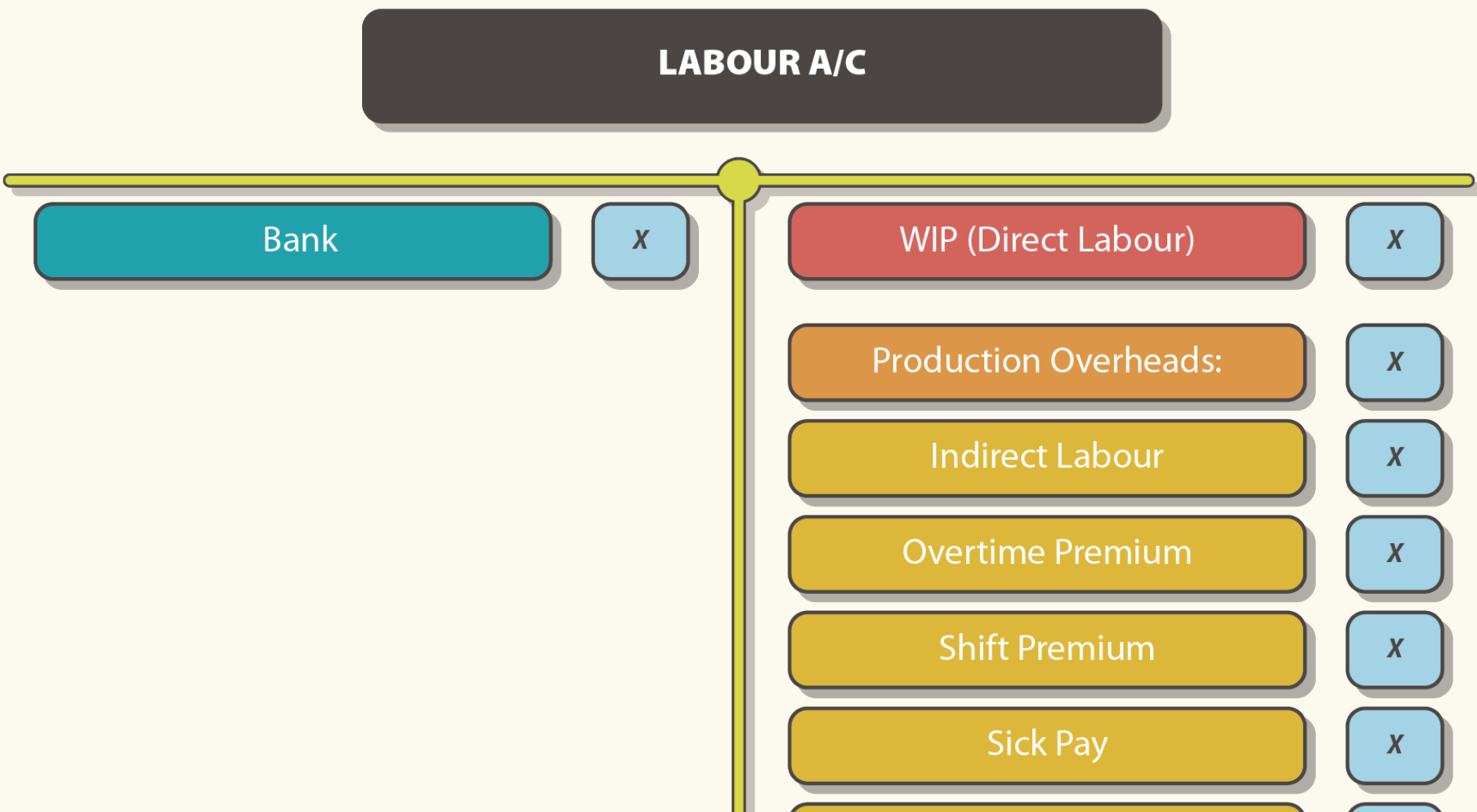
Labour Production Volume Ratio =

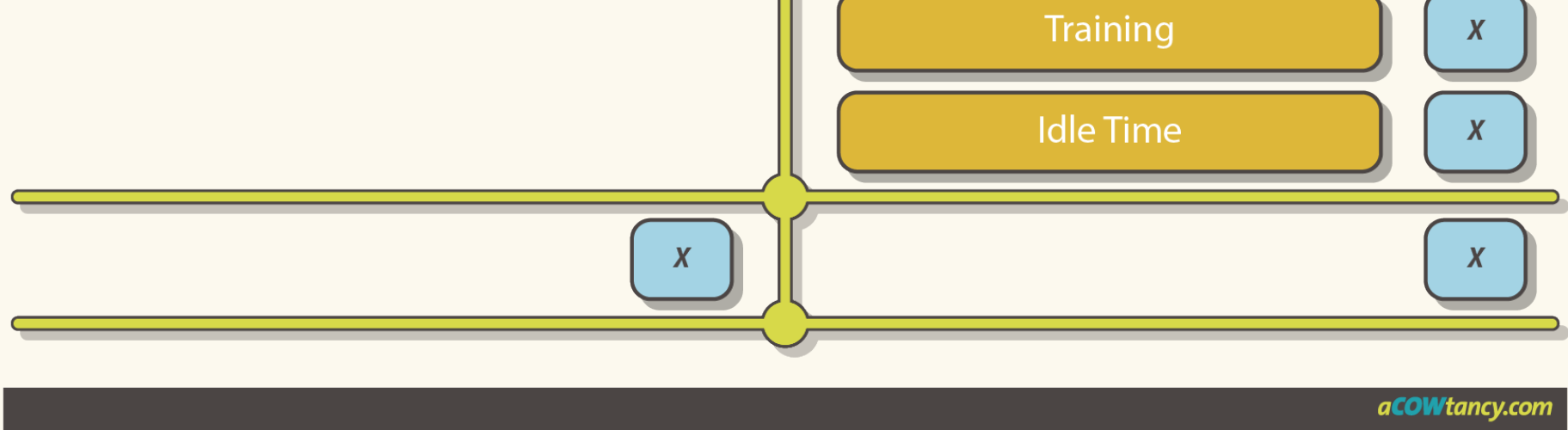
$$\frac{\text{Expected hours to produce actual output}}{\text{Total hours available}} \times 100\%$$





Labour account





Direct and indirect expenses for overheads

Direct and indirect expenses for overheads

The different treatment of direct and indirect expenses

Direct expenses are expenses that can be directly identified with a specific cost unit or cost centre, e.g. the hire of tools and equipment used directly in producing a particular product. Direct expenses are part of the prime cost of a product.

Overheads are indirect expenses which cannot be directly identified with a specific cost unit or cost centre, e.g. factory rent, factory light and heat.

Production overheads = indirect materials + indirect labour + indirect expenses

The total of these indirect costs is usually split into the following

Production overhead

Administration overhead

Selling and distribution overhead

Organisations recover their fixed production overheads by absorbing a fixed amount into each product that they make and sell.

Production overhead absorption rates

Production overhead absorption rates

Production overheads to cost centres using an appropriate basis

Absorption costing is a method used to recover production overheads by absorbing them into the cost of a product.

Therefore, the objective of absorption costing is to include in the total cost of a product an appropriate share of the organisation's total overhead, i.e. an amount which reflects the amount of time and effort that has gone into producing a unit or completing a job.

Absorption costing involves 3 stages

1. allocation and apportionment of overheads
2. reapportionment of service (non-production) cost centre overheads to production cost centres
3. absorption of overheads

Stage 1: - Allocation and apportionment of overheads

Allocation means charging overheads directly to specific departments (both production and service).

If the overheads relate to more than one department, then they must be apportioned / shared between these departments using a fair basis.

Overheads are allocated and apportioned in an overhead analysis sheet.

Possible bases of apportionment include

1. floor area – for rent, rates, heat and light overheads
2. cost or net book value of non-current assets – for depreciation and insurance of machinery
3. number of employees or labour hours worked in each cost centre – for canteen costs; personnel office, welfare, wages, first aid

Stage 2: - Reapportionment of service cost centre overheads to production cost centres

Since service cost centres/departments are not directly involved in making the products, the fixed production overheads of these service cost centres must be shared out between the production departments.

Examples of service cost centres include: - stores, canteen, maintenance and payroll departments.

Two methods are used to reapportion service cost centre costs to production cost centres

1. Basic method – when one service department does work of another service department but not vice-versa
2. Reciprocal method – when both service departments do work for each other

Allocate and apportion production overheads Reapportion service cost centre costs

Reapportion service cost centre costs to production cost centres

As described in the previous section, reciprocal reapportionment is used where service cost centres do work for each other.

Many reapportionments are carried out until all of the service departments' overheads have been reapportioned to the production departments – repeated distribution method.

The results of the reciprocal method of apportionment may also be obtained using algebra and simultaneous equations.

Regardless of the method used, the total overheads for production departments will be the same.

Appropriate bases for absorption rates

Appropriate bases for absorption rates

Stage 3:- Absorption of Overheads

Overhead absorption (overhead recovery) is the process whereby overhead costs allocated and apportioned to production cost centres are added to unit, job or batch costs.

Having allocated and/or apportioned all overheads, the next stage in the costing treatment of overheads is to absorb them into cost units using an overhead absorption rate.

How do we calculate overhead absorption rates?

Estimate the overhead likely to be incurred during the coming period.

Estimate the activity level for the period.

This could be total hours, units, or direct costs or whatever it is upon which the overhead absorption rates are to be based.

Divide the estimated overhead by the budgeted activity level.

This produces the overhead absorption rate.

Absorb the overhead into the cost unit by applying the calculated absorption rate.

Bases of absorption

Overheads can be absorbed into cost units using the following bases of absorption (or 'overhead recovery rates')

A rate per machine hour (for machine intensive departments)

A rate per direct labour hour (for labour intensive departments)

A rate per unit (when production includes identical units)

A percentage of direct materials cost

A percentage of direct labour cost

A percentage of prime cost

A percentage of factory cost (for administration overhead)

A percentage of sales or factory cost (for selling and distribution overhead)

The Overhead Absorption Rate (OAR)

OAR =

$$\frac{\text{Total production overhead}}{\text{Total of absorption basis}}$$

This OAR is calculated for each department. Each product which passes through this department will be charged this overhead rate.

Usually, this OAR is calculated at the beginning of an accounting period in order to determine the OAR for products before they are sold to customers. Therefore, budgeted figures will be used for both production overheads and activity levels.

OAR =

$$\frac{\text{Budgeted overheads}}{\text{Budgeted level of activity}}$$

Sometimes a blanket OAR (single factory-wide OAR) is calculated. Only one absorption rate is calculated for the entire factory regardless of the departments involved in production.

Manufacturing overheads

Manufacturing overheads incurred and absorbed

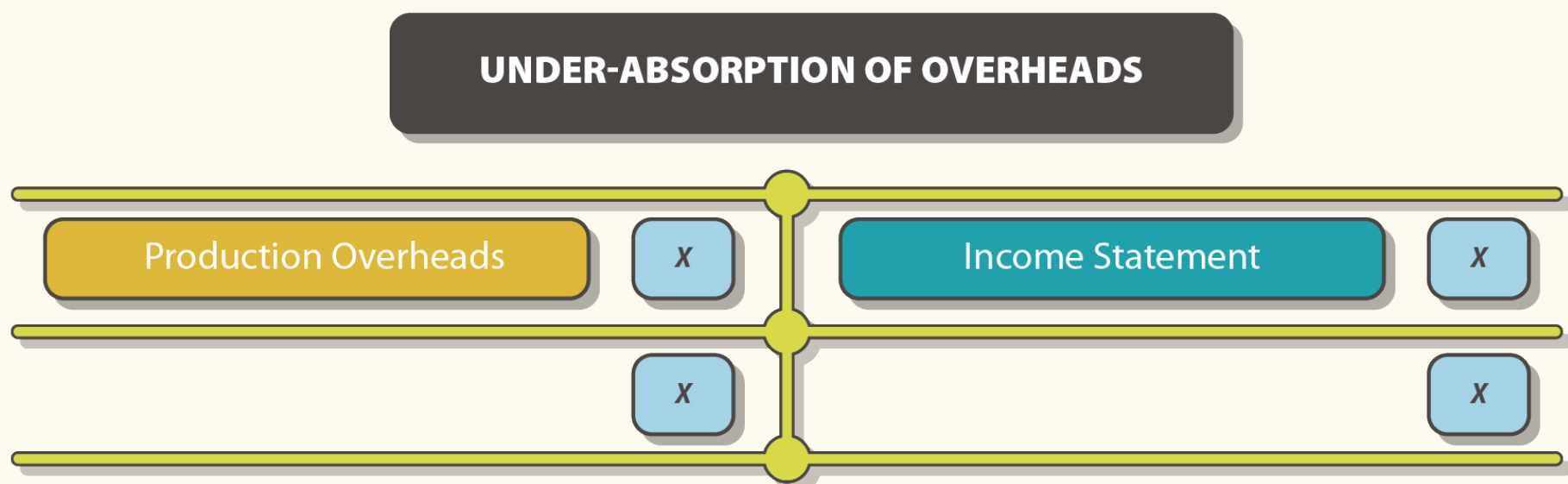
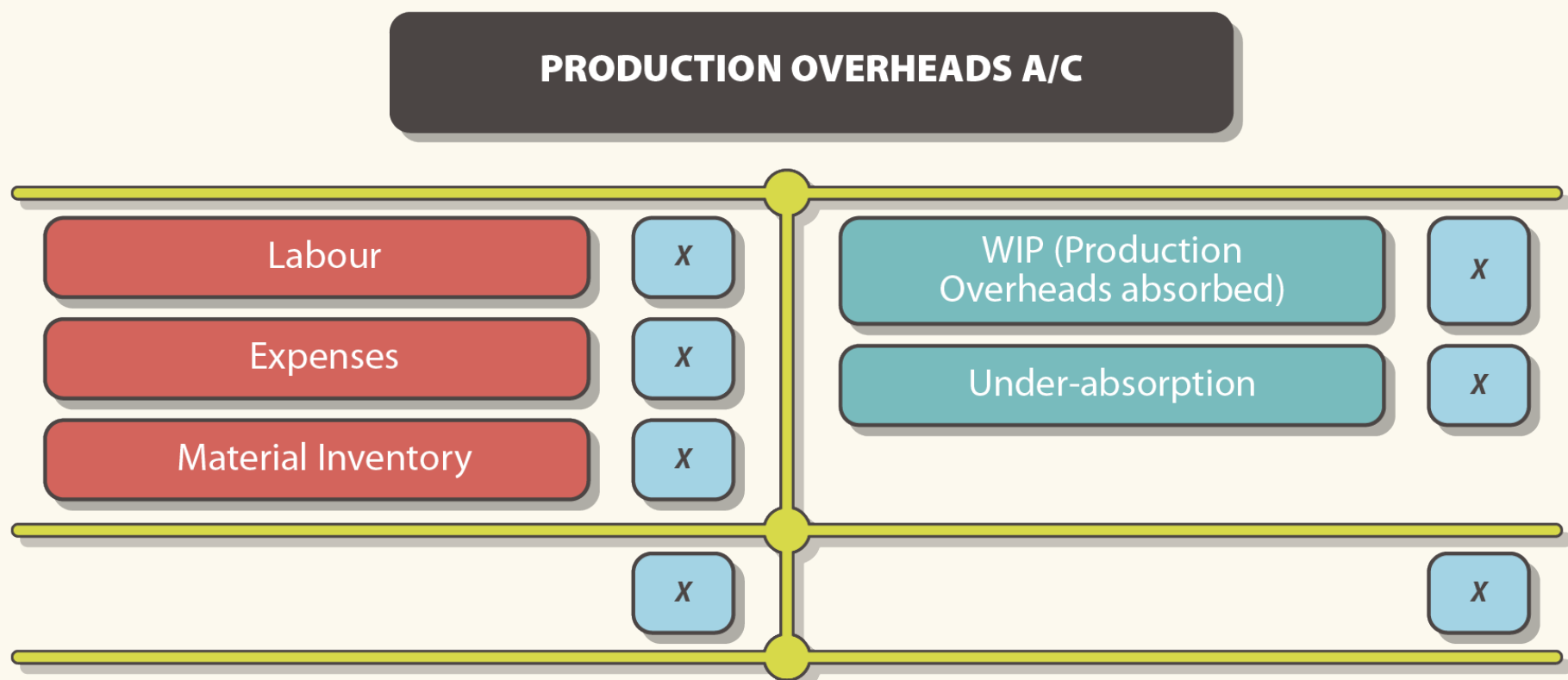
The direct costs of production (materials, labour and expenses) are debited in the work-in-progress (WIP) account.

Indirect production costs are debited in the production overheads account.

At the end of the accounting period, the production overheads account is debited in WIP account.

Absorbed production overheads are credited to the production overheads account and debited in WIP account.

Any over- or under- absorption should be transferred to the income statement at the end of the accounting period



Under and over absorption of overheads

Under and over absorption of overheads

Over and under absorption of overheads occurs because the predetermined overhead absorption rates are based on estimates (both numerator and denominator) and it is quite likely that either one or both of the estimates will not agree with what actually occurs.

At the end of an accounting period, the overheads absorbed will be calculated as follows

Overheads absorbed = predetermined OAR x actual level of activity

1. Over-absorption (over-recovery) means that the overheads absorbed are greater than the overheads actually incurred.
2. Under-absorption (under-recovery) means that the overheads absorbed are less than the actual overheads.

Under– or over-recovery of overhead

Actual overhead costs are different from budgeted overheads

The actual activity level is different from the budgeted activity level

Actual overhead costs and actual activity level differ from the budgeted costs and level

Non-production overheads

Non-production overheads

Non-manufacturing overheads, i.e. administration, distribution and selling overheads and finance costs, may be allocated by choosing a basis for the overhead absorption rate which most closely matches the non-production overhead, or on the basis of a product's ability to bear the costs.

Absorption and Marginal Costing

The concept of contribution

The concept of contribution

Marginal Costing

Marginal costing is an alternative method of costing to absorption costing. In marginal costing, only variable costs are charged as a cost of sale. Therefore, the cost of a unit =

Direct materials + direct labour + variable production overheads

Fixed costs are treated as a period cost, and are charged in full to the income statement of the accounting period in which they are incurred.

Contribution

How do we calculate contribution?

Contribution = Sales price – variable costs

Contribution is of fundamental importance in marginal costing, and the term 'contribution' is really short for 'contribution towards covering fixed overheads and making a profit'.

Total contribution = contribution per unit x sales volume

Profit = Total contribution – Fixed overheads

Absorption and Marginal Costings

Absorption and Marginal Costings

The effect of absorption and marginal costing on inventory valuation and profit determination

Marginal costing values inventory at the total variable production cost of a product. Absorption costing values inventory at the full production cost (including fixed production overheads) of a product.

Inventory values using absorption costing are therefore greater than those calculated using marginal costing.

Since inventory values are different, profits reported in the income statement will also be different.

Profit or loss

Profit or loss

Profit or loss under absorption and marginal costing

In marginal costing, fixed production costs are treated as period costs and are written off as they are incurred.

In absorption costing, fixed production costs are absorbed into the cost of units and are carried forward in inventory to be charged against sales for the next period.

In the long run, total profit for a company will be the same whether marginal costing or absorption costing is used. Different accounting conventions merely affect the profit of individual accounting periods.

	marginal costing income statement	\$	\$
	sales		x
less	variable cost of sales		

	opening inventory	x	
	production cost		
	variable costs	x	

		x	
less	closing inventory	(x)	

			(x)

			x
less	variable selling, dist, admin costs		(x)

	contribution		x
less	fixed costs (actual incurred)		
	production	x	
	selling and distribution	x	
	administration	x	

			(x)

	net profit		x
			==

--	--	--	--

Note that inventories are valued at variable production costs only.

	absorption costing income statement	\$	\$
	sales		x
less	cost of sales		
	opening inventory	x	
	production cost		
	variable costs	x	
	fixed overhead absorbed	x	

		x	
less	closing inventory	(x)	(x)
		---	---
	fixed overhead (under)/over absorbed		x/(x)

	gross profit		x
less	selling, admin etc costs		
	(non production)		(x)

	(non production)		(x)

	net profit		x
			===

Note that inventories are valued at full production cost

marginal costing	absorption costing
closing inventories are valued at marginal production cost	closing inventories are valued at full production cost
fixed costs are period costs	fixed costs are absorbed into unit costs
cost of sales does not include a share of fixed overheads	cost of sales does include a share of fixed overheads

Reconcile the profits or losses

Reconcile the profits or losses

Reported profit figures using marginal costing or absorption costing will differ if there is any change in the level of inventories in the period.

If production is equal to sales, there will be no difference in calculated profits using the costing methods.

If inventory levels increase between the beginning and end of a period, absorption costing will report the higher profit.

This is because some of the fixed production overhead incurred during the period will be carried forward in closing inventory (which reduces cost of sales) to be set against sales revenue in the following period instead of being written off in full against profit in the period concerned.

If inventory levels decrease, absorption costing will report the lower profit because as well as the fixed overhead incurred, fixed production overhead which had been carried forward in opening inventory is released and is also included in cost of sales.

Therefore:

1. If inventory levels increase, absorption costing gives the higher profit
2. If inventory levels decrease, marginal costing gives the higher profit
3. If inventory levels are constant, both methods give the same profit

Profits generated using absorption & marginal costing can also be reconciled as follows:

Difference in the profit = change in inventory in units x OAR per unit

Advantages and disadvantages

advantages of absorption costing	advantages of marginal costing
complies with ias 2 “inventories”	contribution per unit is constant over different sales volumes
better cost control due to analyzing under-/over- absorption	no over- or under- absorption
recognizes that selling price must cover all costs	highlights contribution so appropriate for decision-making
	profit depends on sales and efficiency not on production levels

	simple to operate
disadvantages of absorption costing	disadvantages of marginal costing
profits can be manipulated by changing production levels	contribution may not cover fixed costs
it is based on the assumption that overheads are volume-related	does not comply with ias 2
	fixed production overheads are not shared between units of production but written off in full

Cost Accounting Methods

Characteristics of job and batch costing

Characteristics of job and batch costing

Job costing

Job costing is a costing method applied where work is undertaken to customers' special requirements and each order is of comparatively short duration.

In job costing, production is usually carried out in accordance with the special requirements of each customer. Therefore, it is usual for each job to differ in one or more respects from another job.

The main aim of job costing is to identify the costs associated with completing the order. Individual jobs are given a unique job number and the selling prices of jobs are calculated by adding a certain amount of profit to the cost of the job.

Batch costing

Batch costing is similar to job costing in that each batch of similar articles is separately identifiable.

A batch is a group of similar articles which maintains its identity during one or more stages of production and is treated as a cost unit.

The cost per unit manufactured in a batch is the total batch cost divided by the number of units in the batch.

Cost per unit in batch =

Total production cost of batch

Number of units in batch

The selling prices of batches are calculated by adding a profit to the cost of the batch, i.e. very similar to job costing.

The use of job or batch costing

The use of job or batch costing

Job costing

may be used by: plumbers, electricians, builders, engineering companies, architectures, tile layers etc.

Batch costing

is used by manufacturing companies with manufacture products that are too small to identify the cost per unit; for example, engineering component industry, footwear and clothing manufacturing industries.

Cost records and account

Cost records and account

The usual method of fixing prices in a jobbing concern is cost plus pricing.

Cost plus pricing means that a desired profit margin is added to total costs to arrive at the selling price.

Mark-up profit is calculated as a percentage of the total costs of the job, e.g. 20% mark-up:

	%
selling price	120
total cost	(100)

profit	20
	====

Margin profit is calculated as a percentage of the selling price of the job, e.g. 20% margin

	%
selling price	100
total cost	(80)

profit	20

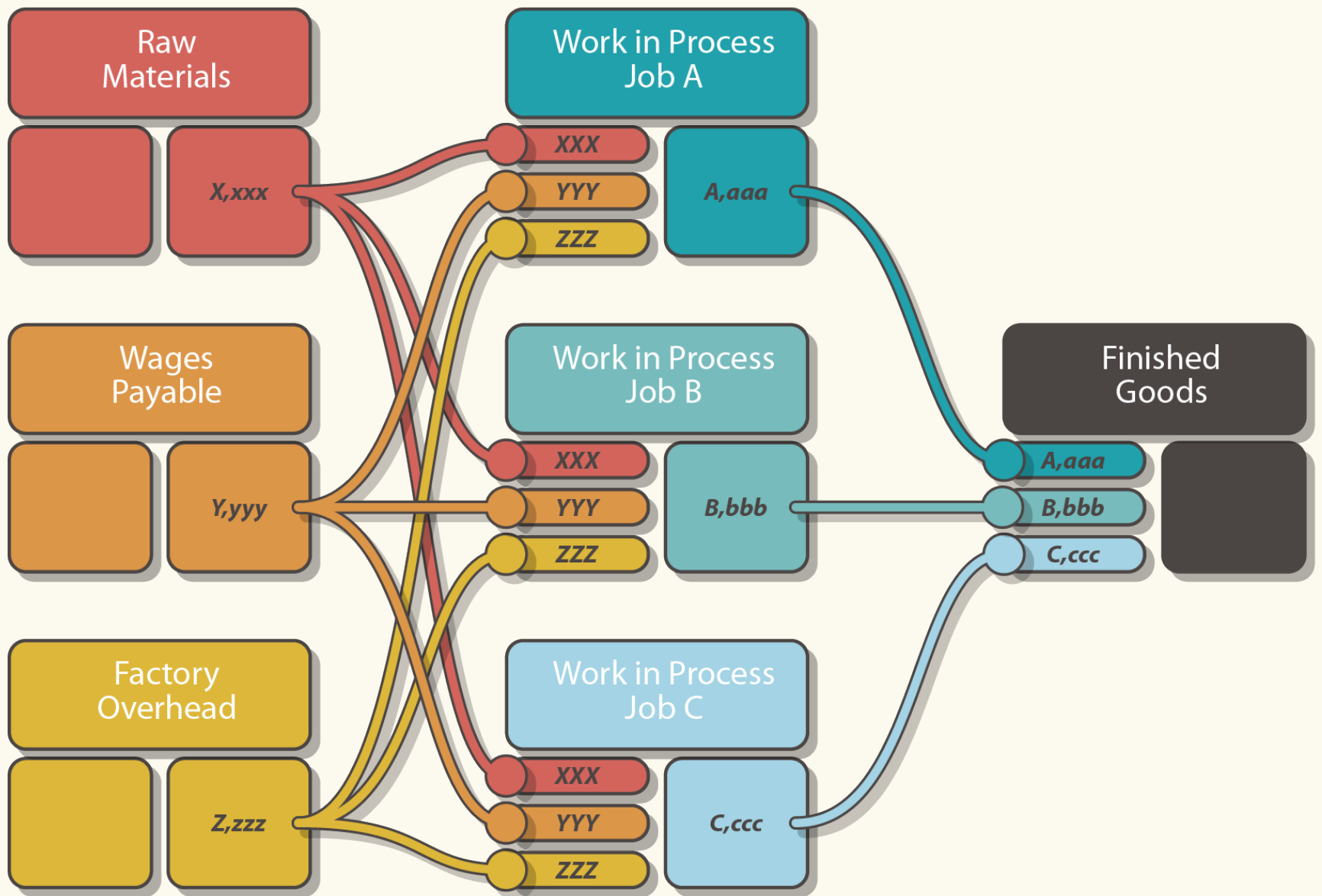
	=====
job cost card	
	job abc
	\$
direct material	x
direct labour	x

prime cost	x
variable overheads	x
fixed overheads	x

total cost	x
profit	x

selling price of job	x
	===

JOB COSTING FLOWS



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Work in progress

Sometimes, jobs may not be 100% complete at year end. The value of work in progress is simply the sum of the costs incurred on incomplete jobs.

Job and batch costs

Characteristics of process costing

Characteristics of process costing

Process costing is a costing method used where it is not possible to identify separate units of production, or jobs, usually because of the continuous nature of the production processes involved.

All the products in the process are identical and indistinguishable from each other.

The essence of process costing involves the averaging of the total costs of each process over the total output of the process.

Average cost per unit =

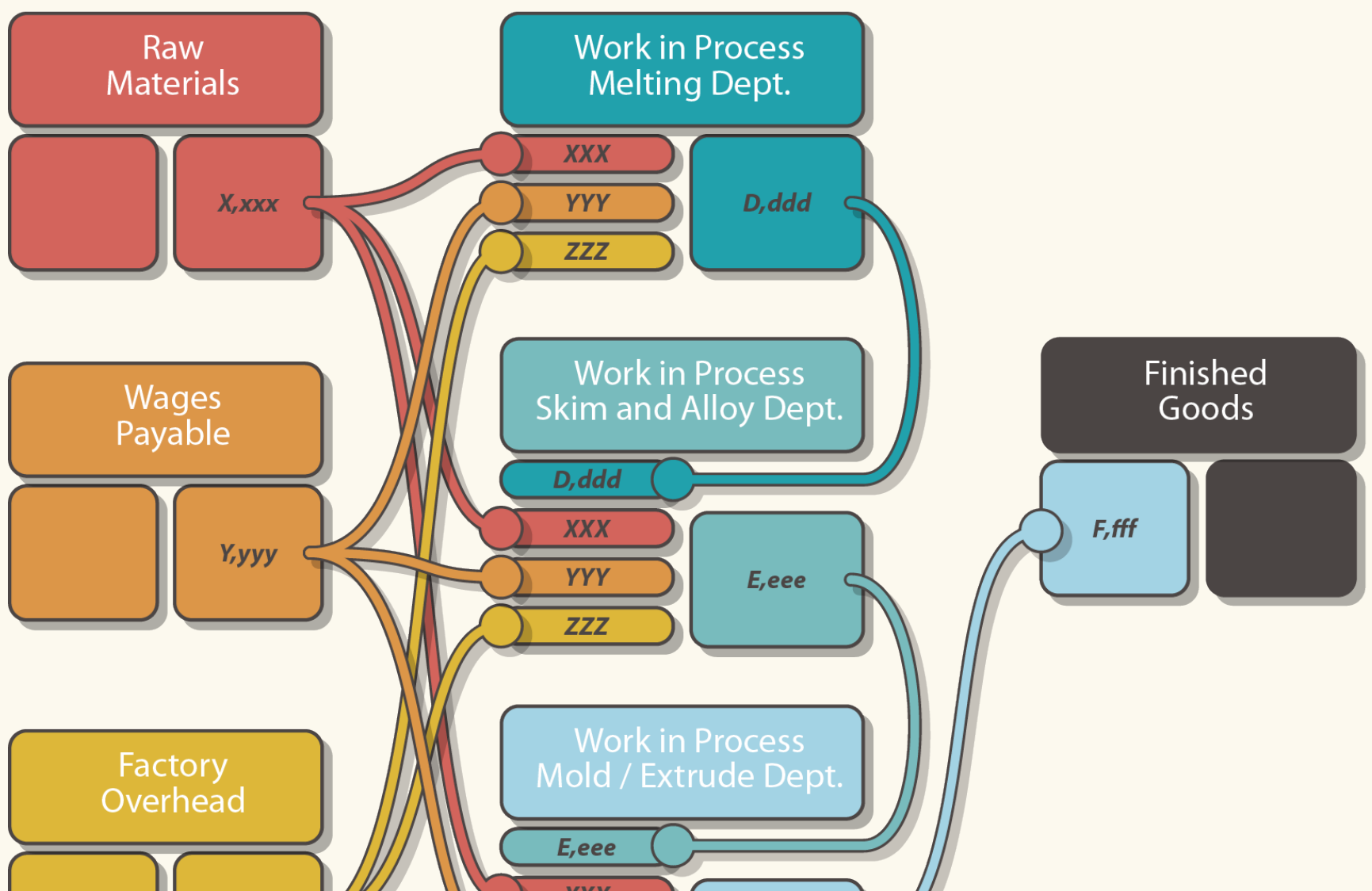
Costs of production

Expected or normal output

The output of one process forms the material input of the next process.

Also, closing work-in-progress (WIP) at the end of one period forms the opening WIP at the beginning of the next period.

PROCESS COSTING FLOWS





Appropriate use of process costing

Appropriate use of process costing

Situations where the use of process costing would be appropriate

It is common to identify process costing with continuous production such as the following

Oil refining

Paper

Foods and drinks

Chemicals

Process costing may also be associated with the continuous production of large volumes of low-cost items, such as cans or tins.

Normal and abnormal losses

Normal and abnormal losses

Concepts of normal and abnormal losses and abnormal gains

It is normal that the total of the input units may differ from the total of the output units.

This usually happens when there are losses or gains in the process.

Normal loss is the loss that is expected in a process and is often expressed as a percentage of the materials input to the process.

Average cost per unit =

Total cost of inputs

Units input – Normal loss

If normal loss is sold as scrap, the revenue is used to reduce the input costs of the process. If normal loss does not have a scrap value, it is valued in the process account as \$Nil.

Average cost per unit =

Total cost of inputs – Scrap value of normal loss

Units input – Normal loss

Normal gain is the expected gain in a process. If the loss or the gain in a process is different to what we are expecting, then we have an abnormal loss or an abnormal gain in the process. If losses are greater than expected, the extra loss is abnormal loss. If losses are less than expected, the difference is known as abnormal gain.

1. The costs of abnormal gains and losses are not absorbed into the cost of good output but are shown as losses and gains in the process account
2. Abnormal loss and gain units are valued at the same cost as units of good output.

Cost per unit of process outputs

The cost per unit of process outputs

The following steps should be followed when answering questions which include normal loss, abnormal loss or abnormal gain

1. Draw the process account, and enter the inputs, i.e. units and values

1. Draw the process account, and enter the inputs, i.e. units and values.

2. Enter the normal loss – units and scrap value if any.

3. Enter the good output – units only.

4. Balance the units. The balancing figure is either abnormal loss or gain.

5. Calculate the average cost per unit

Average cost per unit =

Total cost of inputs – Scrap value of normal loss

Units input – Normal loss

6. Value the good output and abnormal loss or gain at this average cost per unit.

Process accounts

PROCESS A/C					
	Units	\$		Units	\$
Input Cost Raw Material	X	X	Output	X	X
Labour		X	Normal Loss	X	X
Overheads		X	Abnormal Loss	X	X
Abnormal Gain	X	X			
	X	X		X	X

SCRAP A/C

	Units	\$		Units	\$
Normal Loss	X	X	Cash Received	X	X
Abnormal Loss	X	X	Abnormal Gain	X	X
	X	X		X	X

If no scrap value is given, no scrap account can be drawn up and value of normal loss in process account will be nil.

ABNORMAL LOSS / GAIN A/C

	Units	\$		Units	\$
Process	X	X	Scrap	X	X
Income Statement			Income Statement		
Gain	X	X	Loss	X	X
	X	X		X	X

The concept of equivalent units.

The concept of equivalent units.

Equivalent Units

When units are partly completed at the end of a period (and hence there is closing work in progress), it is necessary to calculate the equivalent units of production in order to determine the cost of a completed unit.

the equivalent units of production in order to determine the cost of a completed unit.

It would be unfair to allocate a full unit cost to part-process units so we need to use the concept of equivalent units.

Equivalent units are notional whole units which represent incomplete work, and which are used to apportion costs between work in process and completed output.

Closing work in progress units become opening work in progress units in the next accounting period.

Different degrees of completion

Since material is input at the start of the process, it is only the addition of labour and overheads that will be incomplete at the end of the period.

This means that material cost should be spread over all units but conversion costs should be spread over the equivalent units.

Apportion process costs

Apportion process costs

Work remaining in process (WIP) and fully-completed units can be valued using either weighted average method or the FIFO method.

Weighted average costing of production

In the weighted average method, opening inventory values are added to current costs to provide an overall average cost per unit.

The cost of opening inventory is added to the costs incurred during the period, and completed units of opening inventory are each given a value of one full equivalent unit of production. Therefore, no distinction is made between units in process at the start of a period and those added during the period.

FIFO costing of production

The FIFO method of valuation deals with production on a first in, first out basis.

The assumption is that the first units completed in any period are the units of opening inventory that were held at the beginning of the period.

This means that the process costs must be allocated between

Opening WIP units

Units started and completed in the period

Closing WIP units

This means that if opening WIP units are 60% complete with respect to materials and 30% with respect to conversion costs (labour and overheads), only 40% more work will need to be carried out with respect to materials and 70% with respect to conversion costs.

Which method to choose?

FIFO inventory valuation is more common than the weighted average method, and should be used unless an indication is given to the contrary.

You may find that you are presented with limited information about the opening inventory, which forces you to use either the FIFO or the weighted average method.

The rules are

1. If you are told the degree of completion of each element in opening inventory, but not the value of each cost element, then you must use the FIFO method.
2. If you are not given the degree of completion of each cost element in opening inventory, but you are given the value of each cost element, then you must use the weighted average method.

Process accounts & incomplete work

Process accounts & losses and gains

Process accounts where losses and gains are identified at different stages of the process

What happens if the losses do not occur at the end of the process (as we have seen till now) but part way through a process?

In this case, equivalent units must be used to assess the extent to which costs were incurred at the time at which the loss was identified

By-products and joint products

By-products and joint products

Joint Products

Joint products are two or more products which are output from the same processing operation, but which are indistinguishable from each other up to their point of separation.

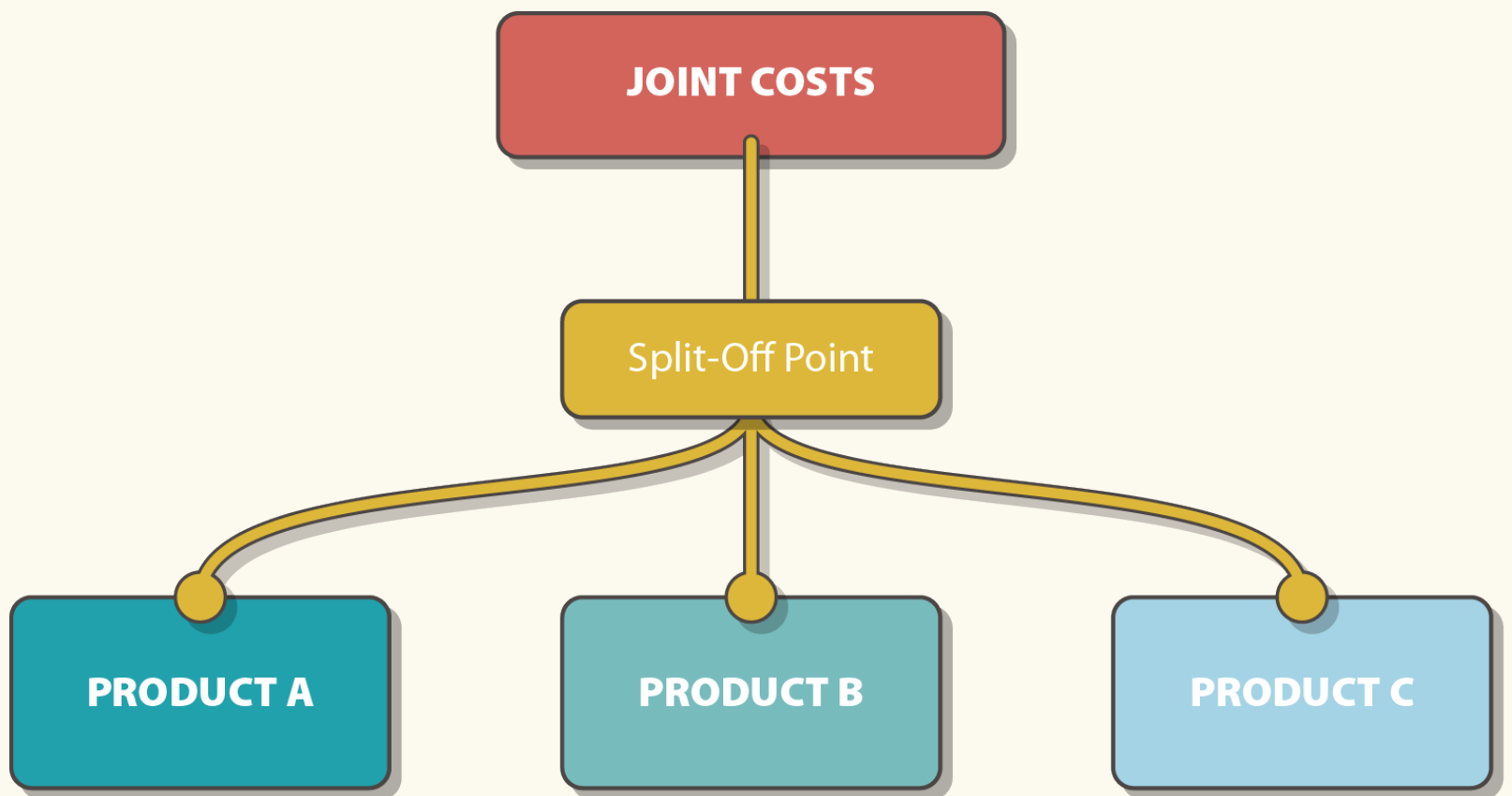
Joint products have a substantial sales value. Often they require further processing before they are ready for sale. Joint products arise, for example, in the oil refining industry where diesel fuel, petrol, paraffin and lubricants are all produced from the same process.

By-Products

A by-product is a supplementary or secondary product (arising as the result of a process) whose value is small relative to that of the principal product.

The distinguishing feature of a by-product is its relatively low sales value in comparison to the main product. In the timber industry, for example, by-products include sawdust, small offcuts and bark.

SPLIT-OFF POINT DIAGRAM



Value by-products and joint products

Value by-products and joint products

Accounting treatment – Joint Products

A joint product is regarded as an important saleable item, and so it should be separately costed.

The profitability of each joint product should be assessed in the cost accounts.

Joint process costs (pre-separation costs) occur before the split-off point. These costs have to be apportioned between the joint products at the split-off point to obtain the costs of each of the products in order to value closing inventory and cost of sales.

The main methods of apportioning joint costs, each of which can produce significantly different results are

1. Sales value of production (market value)
2. Production units
3. Net realisable value

Accounting treatment – By-Products

A by-product is not important as a saleable item, and whatever revenue it earns is a 'bonus' for the organisation. Because of their relative insignificance, by-products are not separately costed.

In fact, by-products do not pick up a share of the costs. Process costs are only shared between the joint products alone.

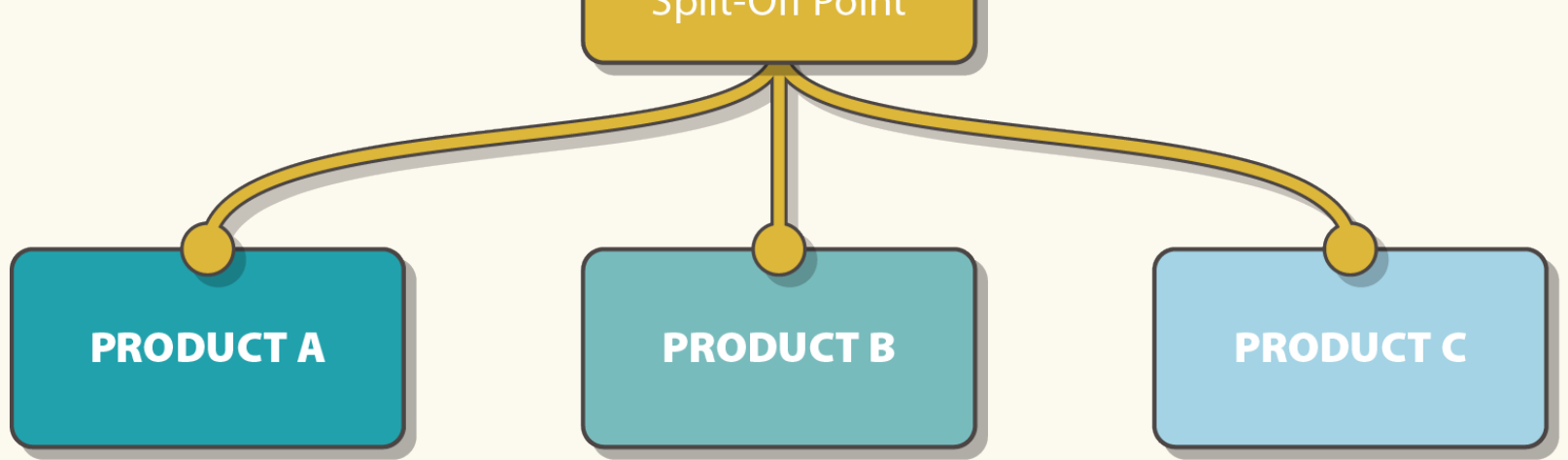
There are four methods to account for by-products

1. Income from by-product is added to sales of the main products
2. By-product income is treated as a separate source of income
3. Sales income of the by-product is deducted from the cost of production in the period
4. Net realizable value of the by-product is deducted from the cost of production in the period

SPLIT-OFF POINT DIAGRAM

JOINT COSTS

Split Off Point



Process accounts & by-products / joint products

Process accounts & by-products / joint products

When preparing process accounts, joint costs should be treated as 'normal' output from a process.

The treatment of by-products in process costing is similar to the treatment of normal loss.

The by-product income is credited to the process account and debited to a by-product account.

To calculate equivalent units in a period, by-products (like normal loss) are zero equivalent units.

The use of service/operation costing

The use of service/operation costing

Situations where the use of service/operation costing is appropriate

Service/operation costing can be used by companies operating in a service industry or by companies wishing to establish the cost of services carried out by some of their departments.

Service costing is used in the following circumstances

1. A company operating in a service industry will cost its services, for which sales revenue will be earned;

examples are electricians, car hire services, road, rail or air transport services, hairdressers, banks, colleges and hotels.
2. A company may wish to establish the cost of services carried out by some of its departments,

i.e. establishing a specific cost for an internal service. For example costs of the vans or lorries used in distribution, the costs of the computer department, or the staff canteen.

Service organisations do not make or sell tangible goods. In fact, the output of service organisations/departments can be described as:

Simultaneous production and consumption

Heterogeneity – the nature and the standard of the service will be variable

Intangibility

Perishability – cannot be stored

Service costing has two basic purposes

To control the costs in the service department

To control the costs of the user departments and prevent the unnecessary use of services.

Suitable unit cost measures

Suitable unit cost measures that may be used in different service/operation situations

The main problem with service costing is the difficulty in defining a realistic cost unit that represents a suitable measure of the service provided.

Frequently, a composite cost unit may be deemed more appropriate.

Therefore, two variables will be considered.

Hotels, for example, may use the 'occupied bed-night' as an appropriate unit for cost ascertainment and control.

Typical cost units used by companies operating in a service industry are

service	cost unit
road, rail and air transport services	passenger/mile or kilometre, ton/mile, tonne/kilometre
hotels	occupied bed-night; guest days
hospitals	patient-days
catering establishment	meals served

The total cost of providing a service will include labour, materials, direct expenses and overheads.

In service costing, labour may be the only direct cost involved in providing a service.

Overheads will make up the remaining total costs.

The cost per service unit is calculated by establishing the total costs involved in providing the service and dividing this by the number of service units in providing the service.

Cost per service unit =

Total costs for period

Number of service units in the period

Service cost analysis

Service cost analysis

If organisations in the same industry use the same service cost units, then comparisons between companies can be made easily.

Alternative Cost Accounting Principles

Activity based costing (ABC)

Absorption Costing vs. ABC

As already discussed, in absorption costing, we allocate overheads to production and service departments.

All service departments' overheads are then reallocated to production departments to find the overhead absorption rate per basis of activity (these vary directly with the volume produced

e.g. machine hours, labour hours or number of units).

Hence, costs are traced to the product because each product item is assumed to consume the resources.

However, in many modern-manufacturing operations, overheads are not primarily influenced by volume.

In fact, the majority of overheads in a modern manufacturing operation are largely unaffected by changes in production volume.

ABC is an alternative costing method to absorption costing.

ABC links overhead costs to the products or services that cause them by absorbing overhead costs on the basis of activities that 'drive' costs (cost drivers) rather than on the basis of production volume.

In ABC, activities are the focus of, the costing process, e.g. equipment preparation, order handling and quality control.

Costs are traced from activities to products based on the products demands for these activities during the production process.

By grouping costs on the basis of cost drivers, we will be able to both manage costs better (by managing the activity) and to calculate the cost of production.

Examples of cost drivers would be

Ordering costs – no. of orders

Set-up costs – no. of set-ups

Steps in establishing and applying ABC

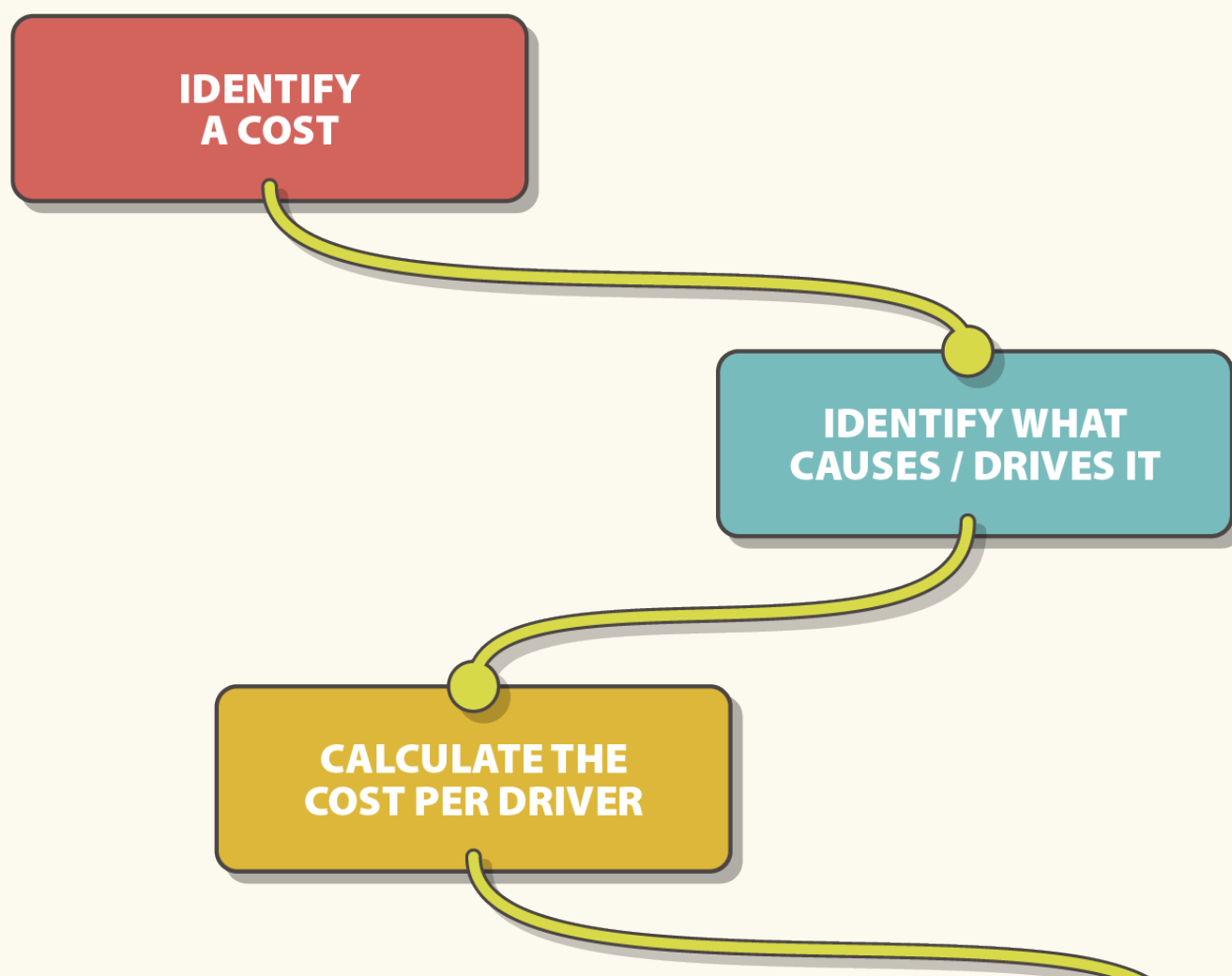
There are 5 main steps in establishing and applying ABC

1. Identify activities that consume resources and incur overhead costs.
2. Allocate overhead costs to the activities that incur them.
3. Determine the cost driver for each activity or cost pool.

Each group of costs which are influenced by a particular cost driver is referred to as a 'cost pool'.

4. Collect data about actual activity for the cost driver in each cost pool
5. Calculate the overhead cost of products or services.

This is done by calculating an overhead cost per unit of the cost driver. Overhead costs are then charged to products or services on the basis of activities used for each product or service.



Advantages of ABC

More accurate cost information is obtained. It identifies ways of reducing overhead costs in the longer-term. This will enable managers to make better decisions, particularly in respect of pricing and marketing activities.

It provides much better insights into what drives overhead costs. ABC recognises that overhead costs are not all related to volume. It also identifies activities and costs that do not add value.

ABC can be applied to all overhead costs, not just production overheads.

Disadvantages of ABC

ABC may not be universally beneficial. There are four major issues to be considered:

Cost vs benefit

The need to analyse costs on a radically different basis will require resources, which will lead to additional costs. Clearly the benefits which will be obtained must exceed these costs.

In general terms, an organisation which has little competition, a stable and standardised product range and for which overheads represent a small proportion of total cost, will not benefit from the introduction of ABC.

Need for informed application

While ABC is likely to provide better information for decision makers, it must still be applied with care. ABC is not fully understood by many managers and therefore is not fully accepted as a means of cost control.

Difficulty in identifying cost drivers

In a practical context, there are frequently difficulties in identifying the appropriate drivers. ABC costs are based on assumptions and simplifications. The choice of both activities and cost drivers might be inappropriate.

Lack of appropriate accounting records

ABC needs a new set of accounting records, this is often not immediately available and therefore resistance to change is common. The setting up of new cost pools is needed which is time-consuming.

Worked out example (no calculations required for exam)

The following example looks at the different activities within a company, their cost and their cost driver.

The cost per driver is found by dividing the total cost of the activity by the quantity of the cost drivers.

Overhead costs are then charged to products or services on the basis of activities used for each product or service.

activity	cost pool \$	cost driver volume	cost/driver \$
process set up	37500	100 set ups	375 / set up
material procurement	9000	50 purchase orders	180 / purchurase order
maintenance	22500	10 standard maintenance plans	1000/ maintenance plan
material handling	22500	2000 material movement	11.25 / material movement
quality control	20500	250 inspections	82 / inspection
order processing	13000	300 customers	43.33 / customer
	----- \$112500 =====		

Target costing

A target cost is a cost estimate derived by subtracting a desired profit margin from a competitive market price.

Target Costing Process

1. Target costing begins by specifying a product an organisation wishes to sell. Ideally only those features valued by customers will be included in the product design.
2. The price at which the product can be sold at is then considered. This will take into account the competitors' products and the market conditions expected at the time that the product will be launched.
3. From the above price a desired margin is deducted. This leaves the cost target. An organisation will need to meet this target if their desired margin is to be met.
4. Costs for the product are then calculated and compared to the cost target mentioned above.
5. If it appears that this cost cannot be achieved, then the difference (shortfall) is called a cost gap. This gap would have to be closed, by some form of cost reduction, if the desired margin is to be achieved.

Target Cost Gap

Where a gap exists between the current estimated cost levels and the target cost, it is essential that this gap be closed. Efforts to close a target cost gap are most likely to be successful at the design stage. It is far easier to 'design out' cost during the pre-production phase than to 'control out' cost during the production phase.

Ways to reduce a cost gap

1. Review the product's features.
2. Remove features that add to cost but do not significantly add value to the product when viewed by the customer.
3. Team approach - The company should bring together members of the marketing, design, assembly and distribution teams to allow discussion of methods to reduce costs. Open discussion and brainstorming are useful approaches here.
4. Review the whole supplier chain - each step in the supply chain should be reviewed, possibly with the aid of staff questionnaires, to identify areas of likely cost savings. For example, the questionnaire might ask 'are there more than five potential suppliers for this component?' Clearly a 'yes' response to this question will mean that there is the potential for tendering or price competition.
5. Reduce waste or idle time that might exist. Where possible, standardised components should be used in the design. Productivity gains may be possible by changing working practices or by de-skilling the process. Automation is increasingly common in assembly and manufacturing.

and manufacturing.

These techniques are known as value-engineering.

Life cycle costing

Life-cycle costing tracks and accumulates the actual costs and revenues attributable to each product from inception to abandonment. It enables a product's true profitability to be determined at the end of the economic life.

Traditional cost accounting systems do not accumulate costs over a product's entire life but focus instead on (normally) twelve month accounting periods. As a result the total profitability of a product over its entire life becomes difficult to determine.

Product Life Cycle

Every product goes through a life cycle

1. Development.

The product has a research and development stage where costs are incurred but no revenue is generated. During this stage, a high level of setup costs will be incurred, including research and development, product design and building of production facilities.

2. Introduction.

The product is introduced to the market. Potential customers will be unaware of the product or service, and the organisation may have to spend further on advertising to bring the product or service to the attention of the market. Therefore, this stage will involve extensive marketing and promotion costs. High prices may be charged to recoup these high development costs.

3. Growth.

The product gains a bigger market as demand builds up. Sales revenues increase and the product begins to make a profit. Marketing and promotion will continue through this stage. Unit costs tend to fall as fixed costs are recovered over greater volumes. Competition also increases and the company may need to reduce prices to remain competitive.

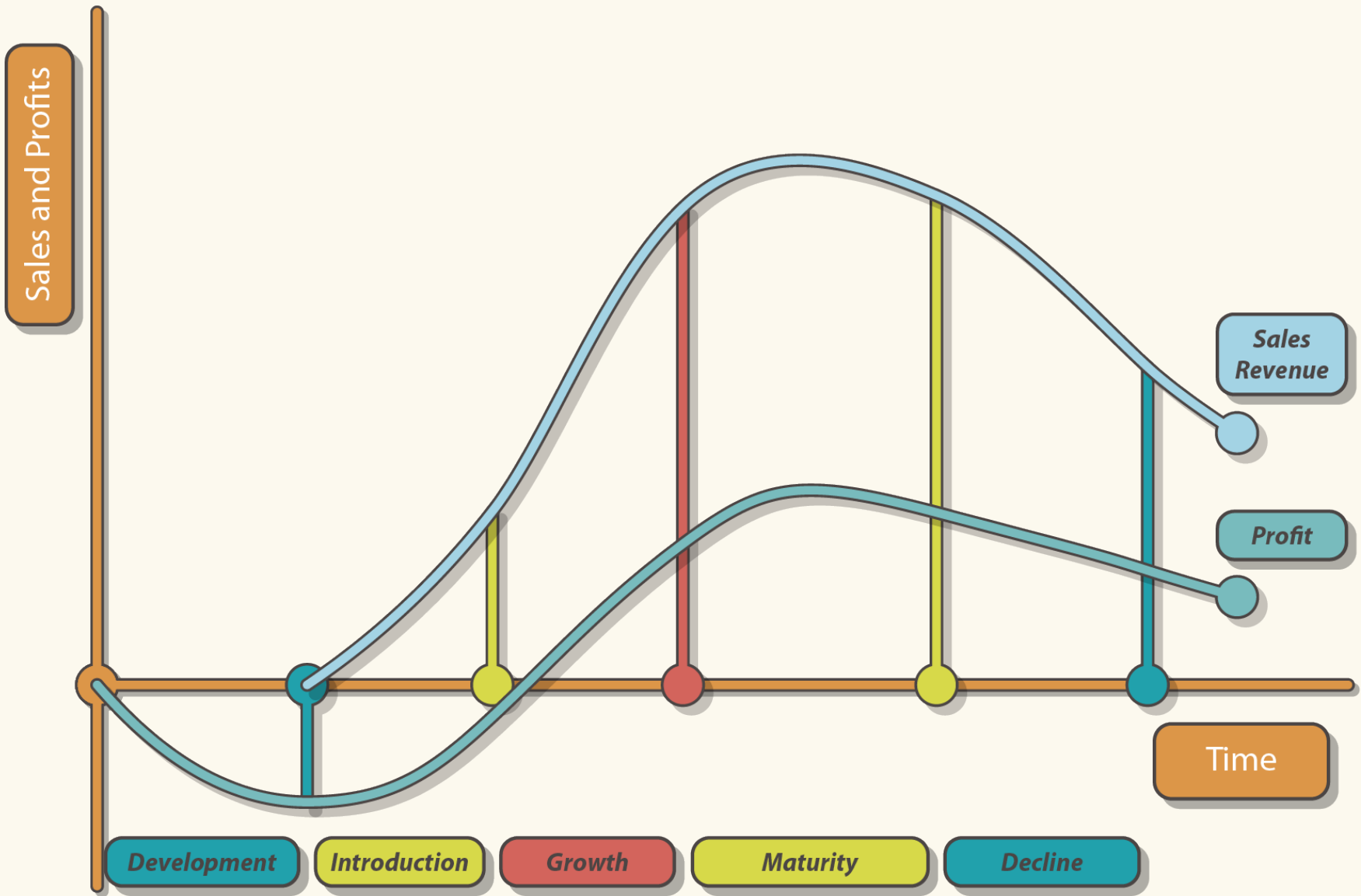
4. Maturity.

Eventually, the growth in demand for the product will slow down and it will enter a period of relative maturity. It will continue to be profitable. However, price competition and product differentiation will start to erode profitability. The product may be modified or improved, as a means of sustaining its demand.

5. Decline.

At some stage, the market will have bought enough of the product and it will therefore reach 'saturation point'. Demand will start to fall and prices will also fall. Eventually it will become a loss maker and this is the time when the organisation should decide to stop selling the product or service. During this stage, the costs involved would be environmental clean-up, disposal and decommissioning. Meanwhile, a replacement product will need to have been developed, incurring new levels of research and development and other setup costs.

The level of sales and profits earned over a life cycle can be illustrated diagrammatically as follows.



Benefits of life cycle costing

The benefits of product life cycle costing are summarised as follows

1. All costs (production and non production) will be traced to individual products over their complete life cycles and hence individual product profitability can be more accurately measured.
2. The product life cycle costing results in earlier actions to generate revenue or to lower costs than otherwise might be considered.
3. Better decisions should follow from a more accurate and realistic assessment of revenues and costs, at least within a particular life cycle stage.
4. Product life cycle thinking can promote long-term rewarding in contrast to short-term profitability rewarding.
5. It helps management to understand the cost consequences of developing and making a product and to identify areas in which cost reduction efforts are likely to be most effective. Very often, 90% of the product's life-cycle costs are determined by decisions made in the development stage. Therefore, it is important to focus on these costs before the product enters the market.
6. Identifying the costs incurred during the different stages of a product's life cycle provides an insight into understanding and managing the total costs incurred throughout its life cycle. Non production costs will become more visible and the potential for their control is increased.
7. More accurate feedback on the success or failure of new products will be available.

Total quality management (TQM)

Introduction

Total quality management (TQM) describes the situation where all business functions are involved in a process of continuous quality improvement.

It focuses on delivering products or services of consistent high quality in a timely fashion. In the past most companies considered quality to be an additional cost of manufacturing, but recently they have begun to realize that quality saves money.

The basic principle of TQM is:

Costs of prevention (getting things right first time) are less than the costs of correction.

Therefore companies should focus on getting things right first time (zero defect philosophy) and then getting them better next time (continuous improvement). There must be real commitment to continuous improvement in all processes by all management.

In his article, Mark Lee Inman listed eight requirements of quality: -

1. Accept that the only thing that matters is the customer
2. Recognize the importance of the customer-supplier relationship
3. Move away from relying on inspecting to a predetermined level of quality and move towards preventing the cause of the defect in

the first place

4. Each employee or group of employees must be personally responsible for defect-free production or service
5. Any level of defects is unacceptable
6. All departments should try to get things right first time
7. Quality certification programmes should be introduced
8. The cost of poor quality should be emphasized as good quality generates savings

Cost of Quality

A cost of quality report should be prepared to indicate the total cost to the organisation of producing products or services that do not conform with quality requirements. Four categories of costs should be reported:-

1. Prevention Costs are the costs incurred in preventing the production of products that do not conform to specification. They include the costs of preventive maintenance, quality planning and training, the extra costs of acquiring higher quality raw materials and quality circles.
2. Appraisal Costs are the costs incurred to ensure that materials and products meet quality conformance standards. They include the costs of inspecting purchased parts, work in process and finished goods, quality audits and field tests.
3. Internal Failure Costs are the costs associated with materials and products that fail to meet quality standards. They include costs incurred before the product is dispatched to the customer, such as the costs of scrap, repair, downtime, and work stoppages caused by defects.
4. External Failure Costs are the costs incurred when products or services fail to conform to requirements or satisfy customer needs after they have been delivered. They include the costs of handling customer complaints, warranty replacement, repairs of returned products and the costs arising from a damaged company reputation. Costs within this category can have a dramatic impact on future sales.

Prevention and appraisal costs are sometimes referred to as the costs of quality conformance or compliance. Costs of compliance are incurred with the intention of eliminating the costs of failure.

Internal and external failure costs are also known as the costs of non-conformance or non-compliance. Costs of non-compliance are the result of production imperfections and can only be reduced by increasing compliance expenditure.

Budgets

Nature and Purpose of Budgeting

Nature and Purpose of Budgeting

Why organisations use budgetin

The use of Budgeting

A budget is a quantified plan of action for a forthcoming accounting period. A budget is a plan of what the organisation is aiming to achieve and what it has set as a target. A forecast is an estimate of what is likely to occur in the future.

The budget is 'a quantitative statement for a defined period of time, which may include planned revenues, expenses, assets, liabilities and cash flows. A budget facilitates planning'.

The objectives of a budgetary planning and control system are

- To ensure the achievement of the organisation's objectives
- To compel planning in line with the objectives of the organisation
- To communicate ideas and plans to individual managers
- To coordinate the different activities so that managers are working towards the same common goal
- To evaluate the performance of management
- To establish a system of controlling costs by comparing actual results with the budget
- To motivate employees to improve their performance and beat targets

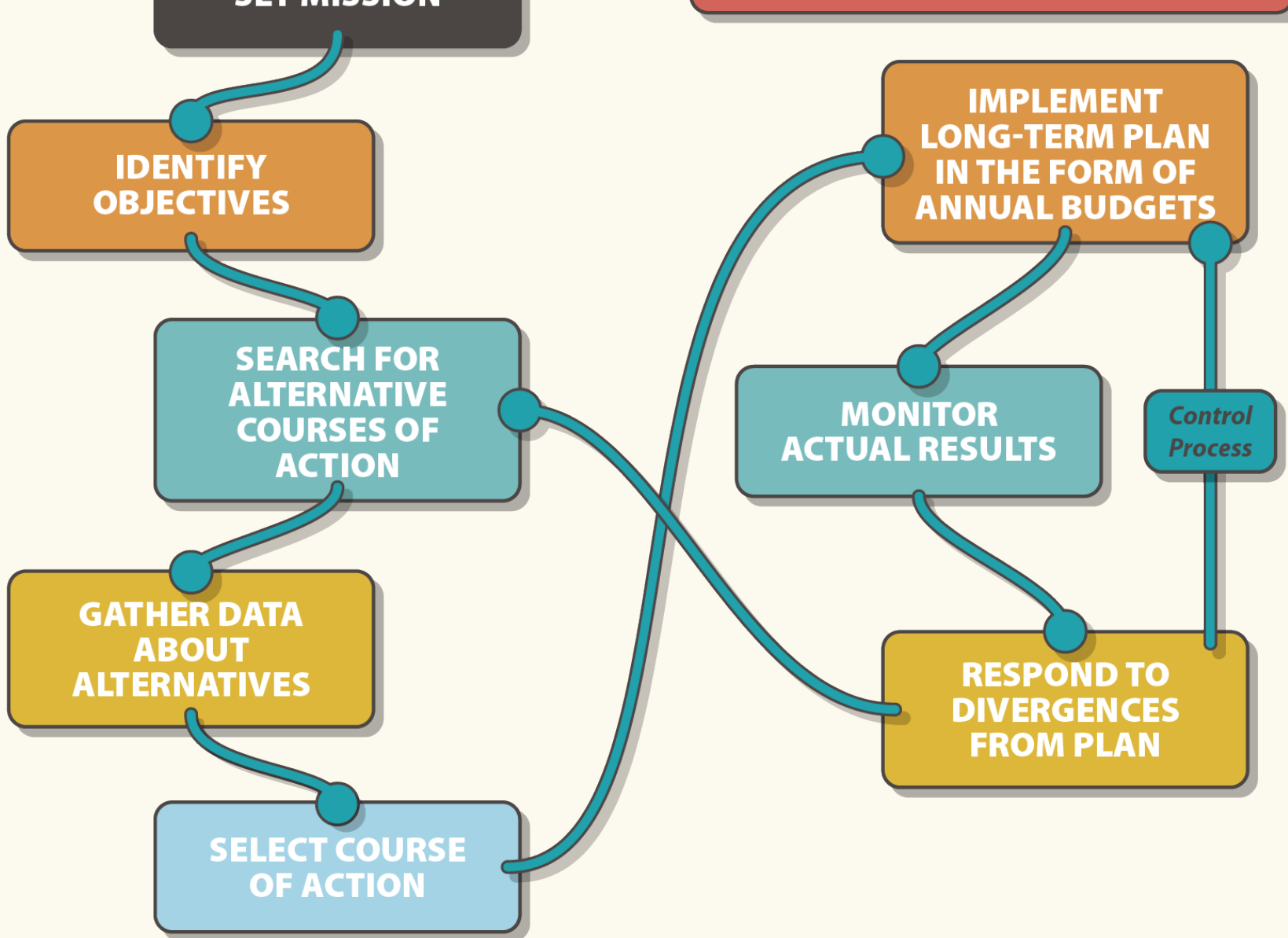
Planning and control cycle

The overall is summarized in the diagram below

Long Term Planning Process

SET MISSION

Budget Process



Planning and control cycle

Stage 1:- Set Mission

This involves establishing the broad overall aims and goals of the organization – its mission may be both economic and social. Most organizations now prepare and publish their mission in a mission statement.

Mission statements often include the following information

Purpose and aim(s) of the organization

The organization's primary stakeholders: clients/customers, shareholders, congregation, etc.

How the organization provides value to these stakeholders, for example by offering specific types of products and/or services

Stage 2:- Identify Objectives

This requires the company to specify objectives towards which it is working. The objectives chosen must be quantified and

This requires the company to specify objectives towards which it is working. The objectives chosen must be quantified and have a timescale attached to them. Objectives should be SMART

Specific

Measurable

Achievable

Relevant

Time limited

Stage 3:- Search for possible courses of action

A series of specific strategies should be developed. Strategy is the course of action, including the specification of resources required, that the company will adopt to achieve its specific objective.

To formulate its strategies, the firm will consider the products it makes and the markets it serves. E.g. of strategies are

Developing new markets for existing products

Developing new products for existing markets

Developing new products for new markets

Stage 4:- Gathering data about alternatives and measuring pay-offs

Stage 5:- Select course of action

Having made decisions, long-term plans based on those decisions are created.

Stage 6:- Implementation of short-term (operating) plans

This stage shows the move from long-term planning to short-term plans – the annual budget. The budget provides the link between the strategic plans and their implementation in management decisions.

Stage 7:- Monitor actual outcomes

Detailed financial and other records of actual performance are compared with budget targets (variance analysis)

Stage 8:- Respond to divergences from plan

This is the control process in budgeting, responding to divergences from plan either through budget modifications or through identifying new courses of action

Administrative procedures

The administrative procedures used in the budgeting process

In organising and administering a budget system the following characteristics may apply:

a) Budget centres:

Units responsible for the preparation of budgets. A budget centre may encompass several cost centres.

b) Budget committee:

This may consist of senior members of the organisation, e.g. departmental heads and executives (with the managing director as chairman). Every part of the organisation should be represented on the committee, so there should be a representative from sales, production, marketing and so on. Functions of the budget committee include:

- Coordination of the preparation of budgets, including the issue of a manual

- Issuing of timetables for preparation of budgets

- Provision of information to assist budget preparations

- Comparison of actual results with budget and investigation of variances

c) Budget Officer :

Controls the budget administration The job involves:

- liaising between the budget committee and managers responsible for budget preparation

- dealing with budgetary control problems

dealing with budgetary control problems

ensuring that deadlines are met

educating people about budgetary control.

d) Budget manual:

This document, which is usually prepared by the management accountant:

charts the organisation

details the budget procedures

contains account codes for items of expenditure and revenue

timetables the process

clearly defines the responsibility of persons involved in the budgeting system.

Stages in the budgeting process

Stages in the Budgetary Process

These may be identified as follows

Stage1: Communicating policy guidelines to preparers of budgets

The long-term plan forms the framework within which the budget is prepared. It is therefore necessary to communicate the implications of that plan to the people who actually prepare the budget.

Stage 2: Determining the factor that restricts output – Principal Budget Factor

Generally there will be one factor which restricts performance for a given period. Usually this will be sales, but it could be production capacity, or some special labour skills.

Stage 3: Preparation of a budget using the principal budgetary factor

On the assumption that sales is the principal budget factor, the next stage is to prepare the sales budget. This budget is very much dependent on forecast sales revenue.

Stage 4: Initial preparation of budgets

Ideally budgets should be prepared by managers responsible for achieving the targets contained therein. This is referred to as participative budgeting.

Stage 5: Co-ordination and review of budgets

At this stage the various budgets are integrated into the complete budget system. Any anomalies between the budgets must be resolved and the complete budget package subject to review. At this stage the budget income statement, balance sheet and cash flow must be prepared to ensure that the package produces an acceptable result.

Stage 6: Final acceptance of budgets

All of the budgets are summarized into a master budget, which is presented to top management for final acceptance.

Stage 7: Budget review

The budget process involves regular comparison of budget with actual, and identifying causes for variances. This may result in modifications to the budget as the period progresses

Statistical Techniques

Using High low method

Using high low method to estimate the fixed and variable element of costing

The high low method is one of the methods used to analyse semi-variable costs into their fixed and variable elements.

The main steps are

1. Review records of costs in previous periods.

- Select the period with the highest activity level.
- Select the period with the lowest activity level.

2. Find the variable cost per unit

$$\frac{\text{Total cost at high activity level} - \text{total cost at low activity level}}{\text{Total units at high activity level} - \text{total units at low activity level}}$$

3. Find the fixed costs

$$\text{Total cost at high activity level} - (\text{Total units at high activity level} \times \text{Variable cost per unit})$$

Advantages of the High-Low Method

1. Easy to use
2. Easy to understand
3. Quick method

Limitations of the High-Low Method

1. It relies on historical cost data – predictions of future costs may not be reliable
2. It assumes that the activity level is the only factor affecting costs
3. It uses only two values to predict costs – all data falling between the highest and lowest values are ignored
4. Bulk discounts may be available at large quantities

Scatter diagrams and lines of best fit

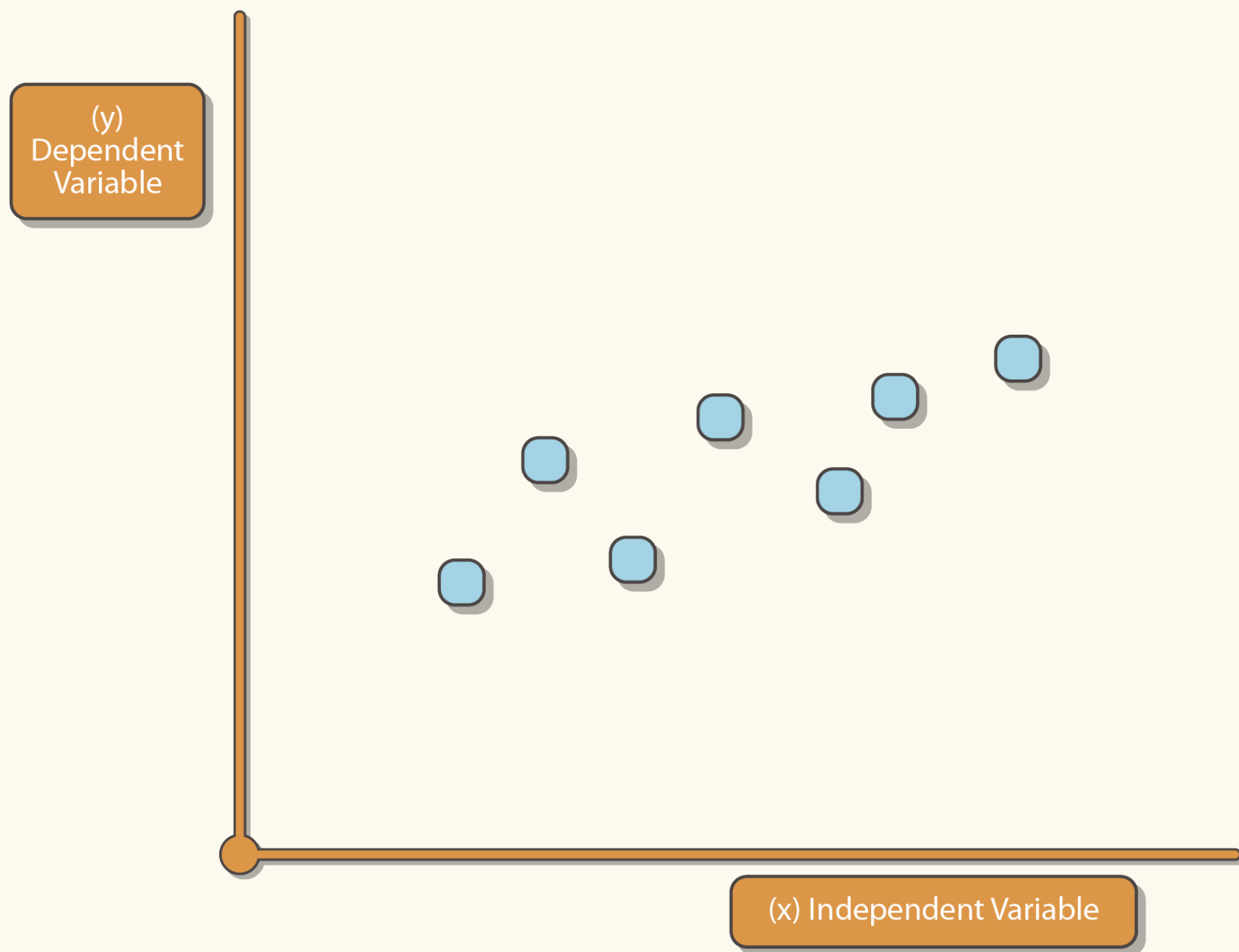
Information about two variables that are considered to be related in some way can be represented on a form of graph known as a ‘scatter diagram’, each axis representing one variable.

For example, the level of advertising expenditure and sales revenue of a product, or the level of electricity cost and the number of units produced can be plotted against each other.

The values of the two variables are plotted together to show a number of points on the graph. The way in which these are scattered or dispersed indicates if any relationship is likely to exist between the variables.

For example; the following scatter graph shows the relationship between 2 variables; the independent variable can be the units, and the dependent variable could be production costs.

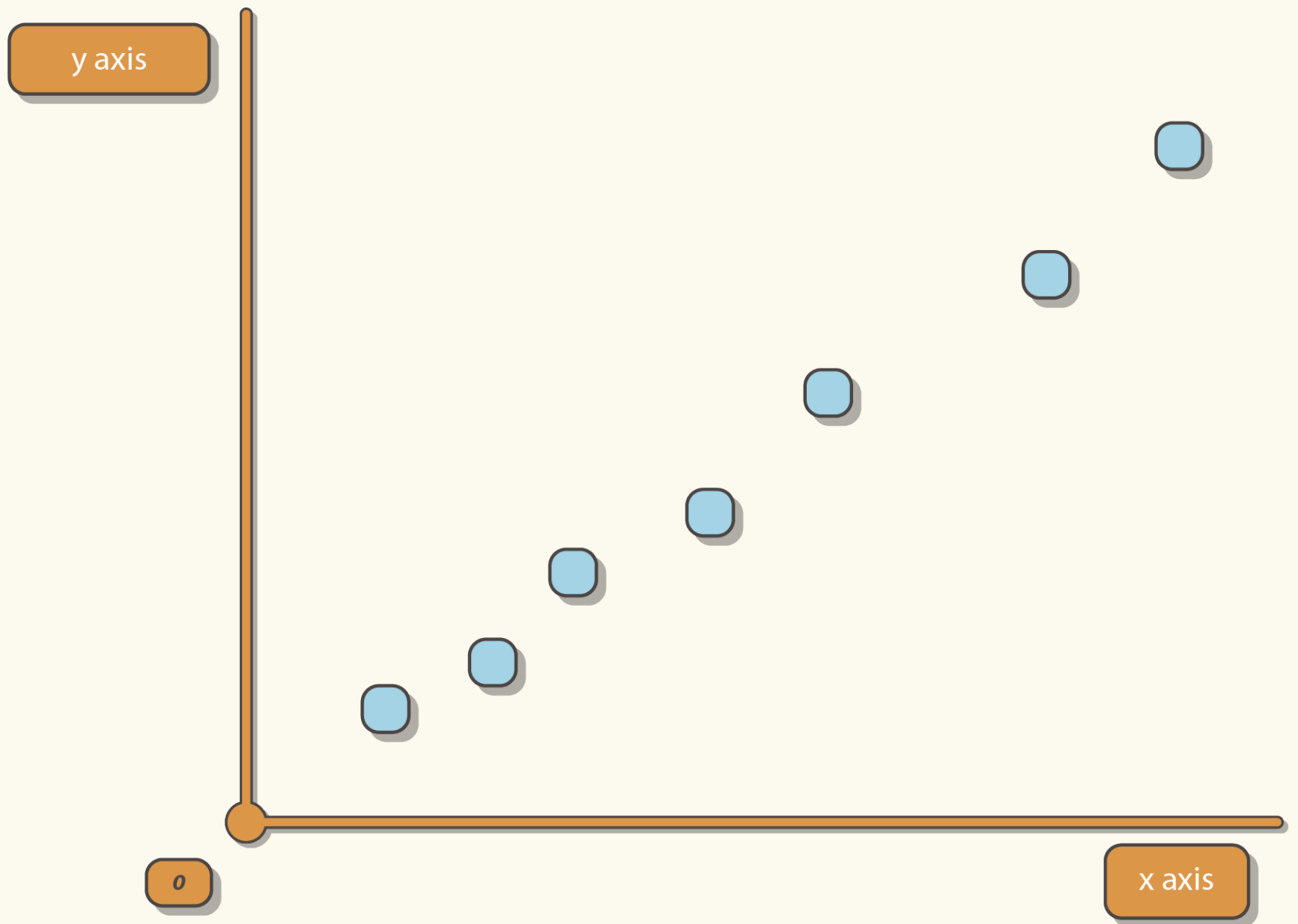
the dependent variable can be production cost.



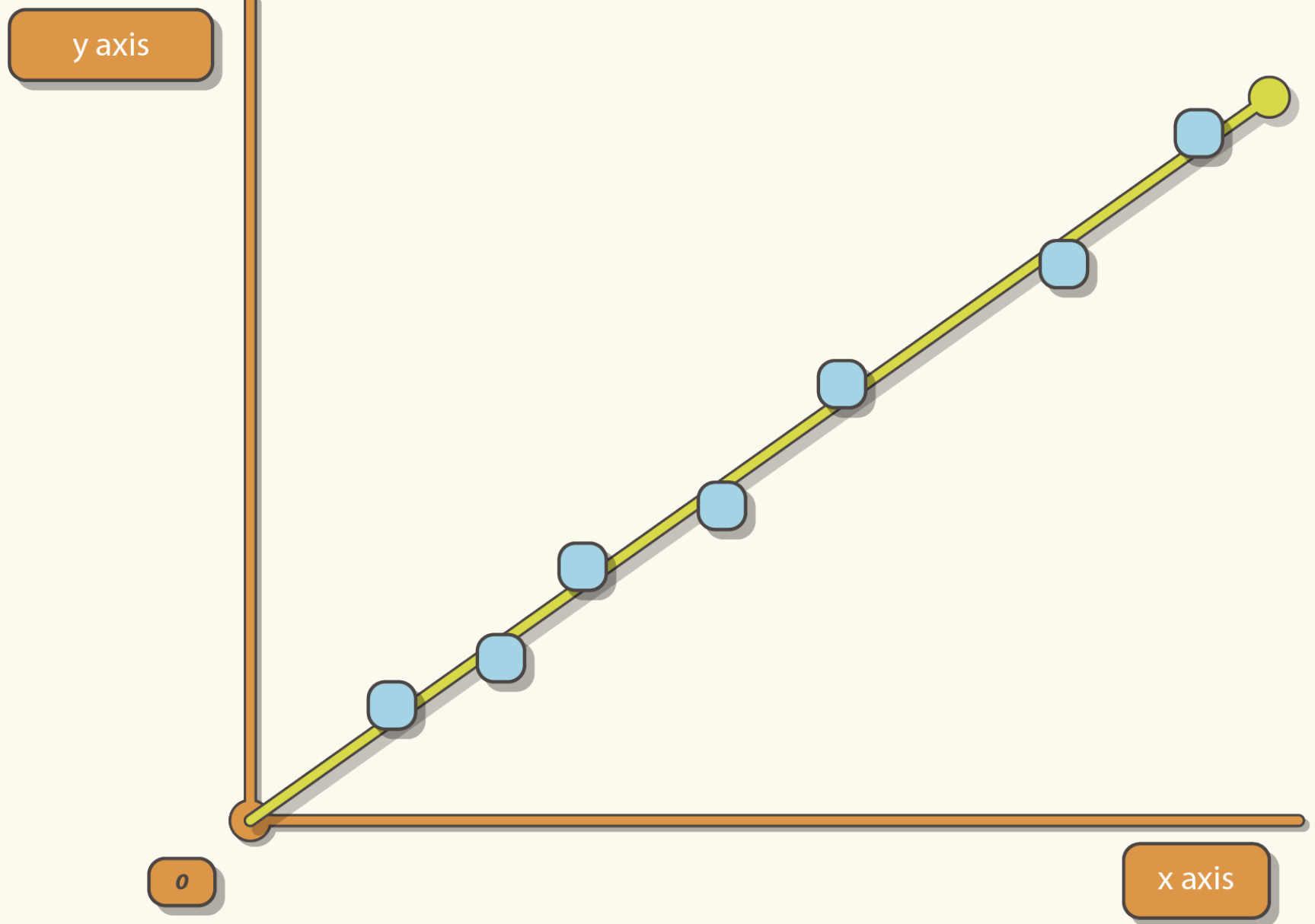
Line of Best Fit

The "best-fit" line (trend line) is the straight line which passes as near to as many of the points as possible. By drawing such a line, we are attempting to minimise the effects of random errors in the measurements.

For example, if our points look like this



The line of best fit would be drawn as follows



When we have our line of best fit drawn on the scatter diagram, we can use it to read off values for the variables at any points on the axes.

In doing this, we have to assume that the line of best fit is accurately drawn and that the relationship established, based on past data, will also apply in the future - this is known as extrapolating the trend.

Using scatter diagrams with lines of best fit is useful as a forecasting technique and has the advantage of relative simplicity.

Disadvantages

Attempts to forecast future information from past information

Assumes relationships are linear

Uses a line of best fit which is matched to the points on the scatter diagram by eye - this is likely to be a major cause of inaccuracy, as the points in the scatter diagram may not fit the line perfectly.

inaccuracy unless the points in the scatter are very tightly clustered together.

A more mathematical technique, regression analysis, is available to improve the accuracy of the line of best fit.

Analysis of cost data

Linear regression analysis is based on working out an equation for the line of best fit.

The line of best fit will be of the form

$$y = a + bx$$

where

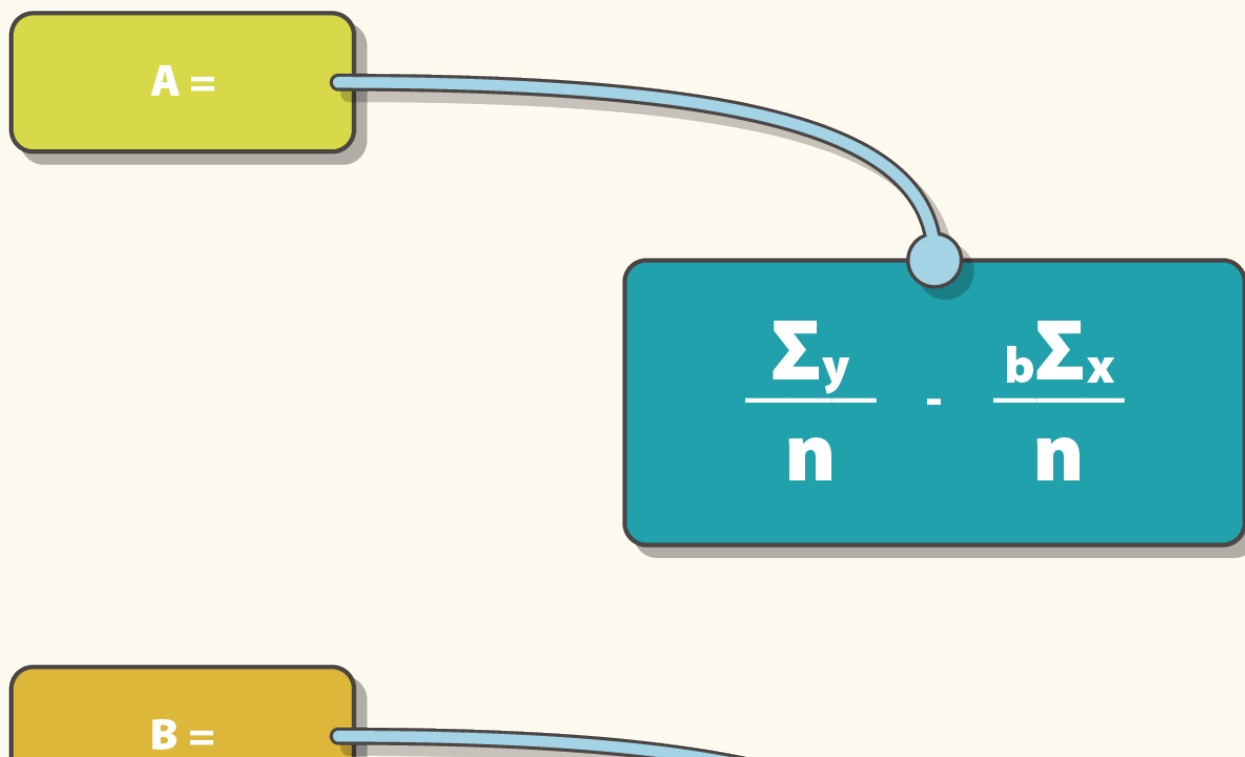
y is the value of the dependent variable (on vertical axis)

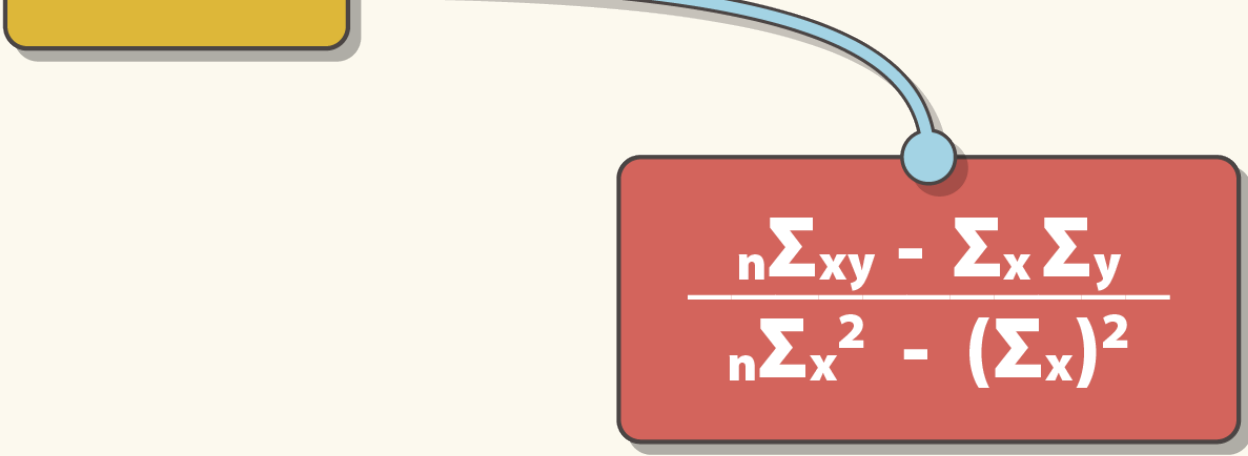
a is the intercept - fixed costs

b is the slope of the line - variable costs

x is the value of the independent variable (on horizontal axis)

i. How do we calculate 'a' and 'b'?





$$\frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

How do we calculate 'a' and 'b'?

'a' is the fixed cost per period

'b' is the variable cost per unit

'x' is the activity level (independent variable)

'y' is the total cost = fixed cost + variable cost

'n' is the sample size – number of pairs of data

These formulae are given in the exam. Remember always start working 'b', then move to 'a'.

Correlation

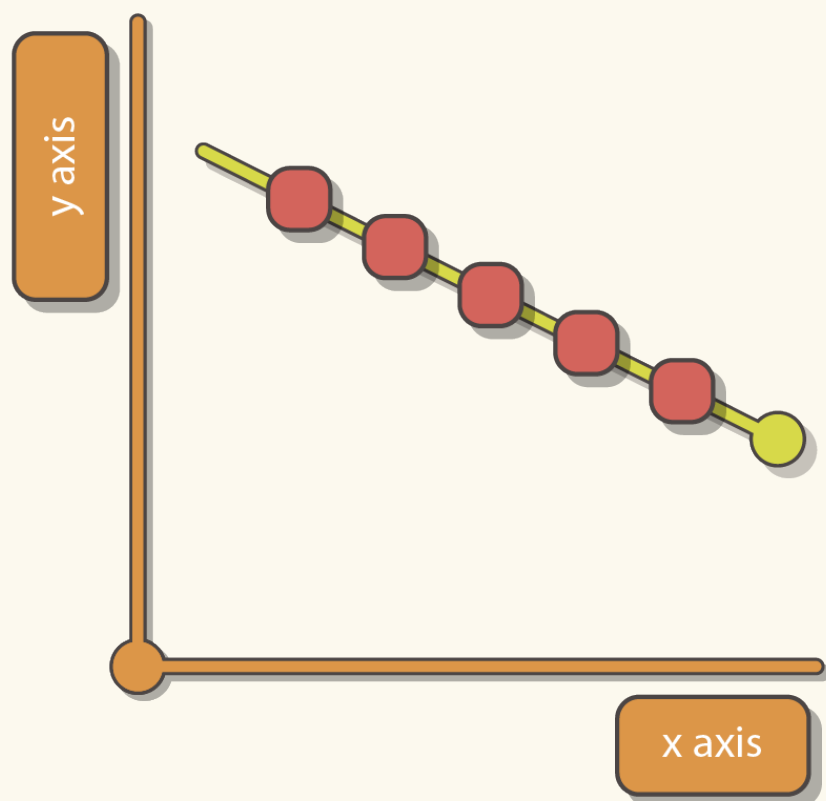
Correlation measures the strength of the relationship between two variables.

One way of measuring 'how correlated' two variables are, is by drawing the 'line of best fit' on a scatter graph. When correlation is strong, the estimated line of best fit should be more reliable.

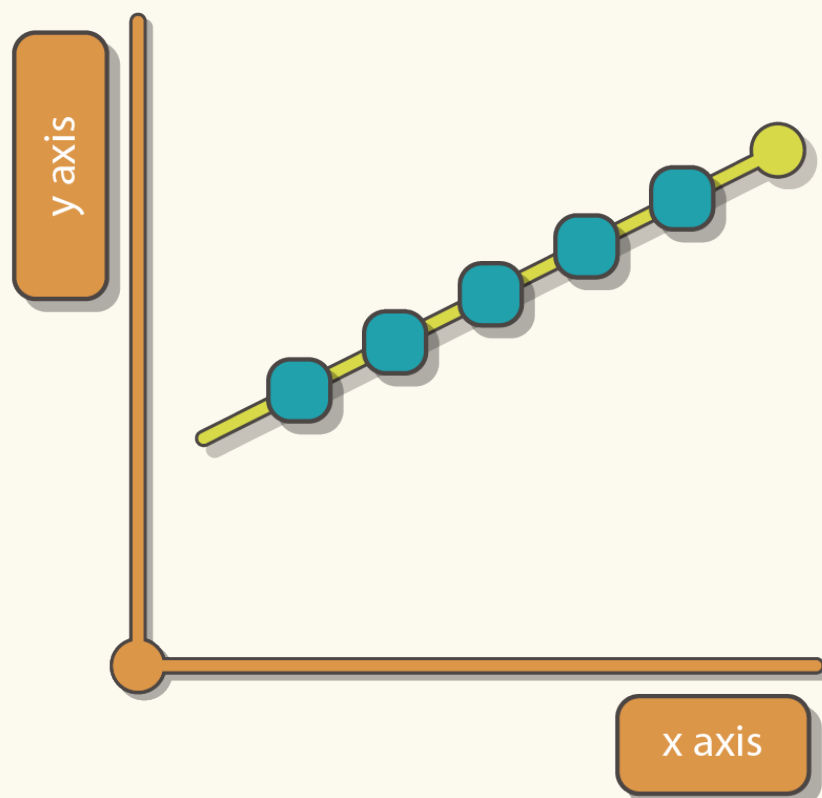
Another way of measuring 'how correlated' two variables are, is to calculate a correlation coefficient, r.

Different degrees of correlation

PERFECT POSITIVE LINEAR

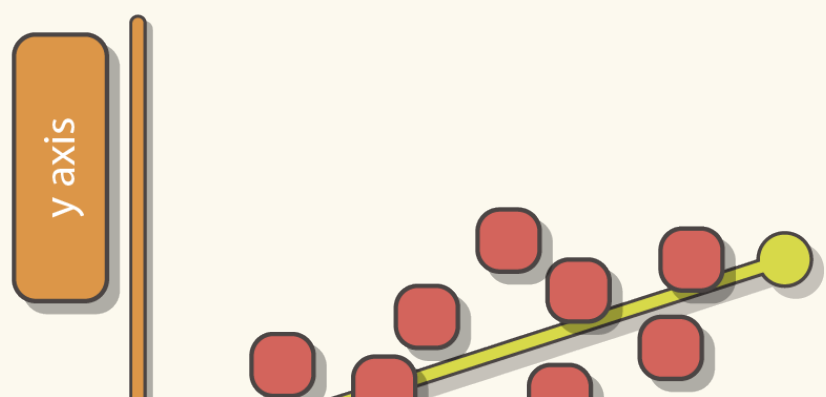


PERFECT NEGATIVE LINEAR



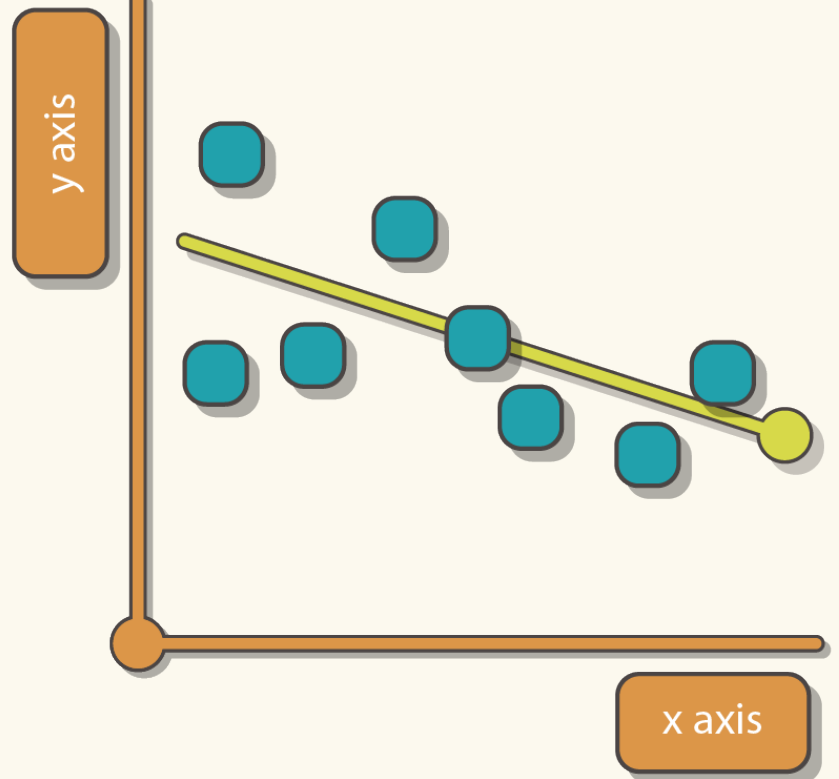
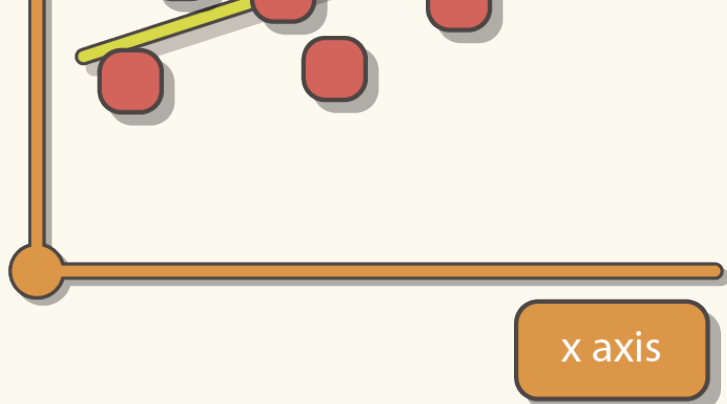
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MODERATE POSITIVE CORRELATION

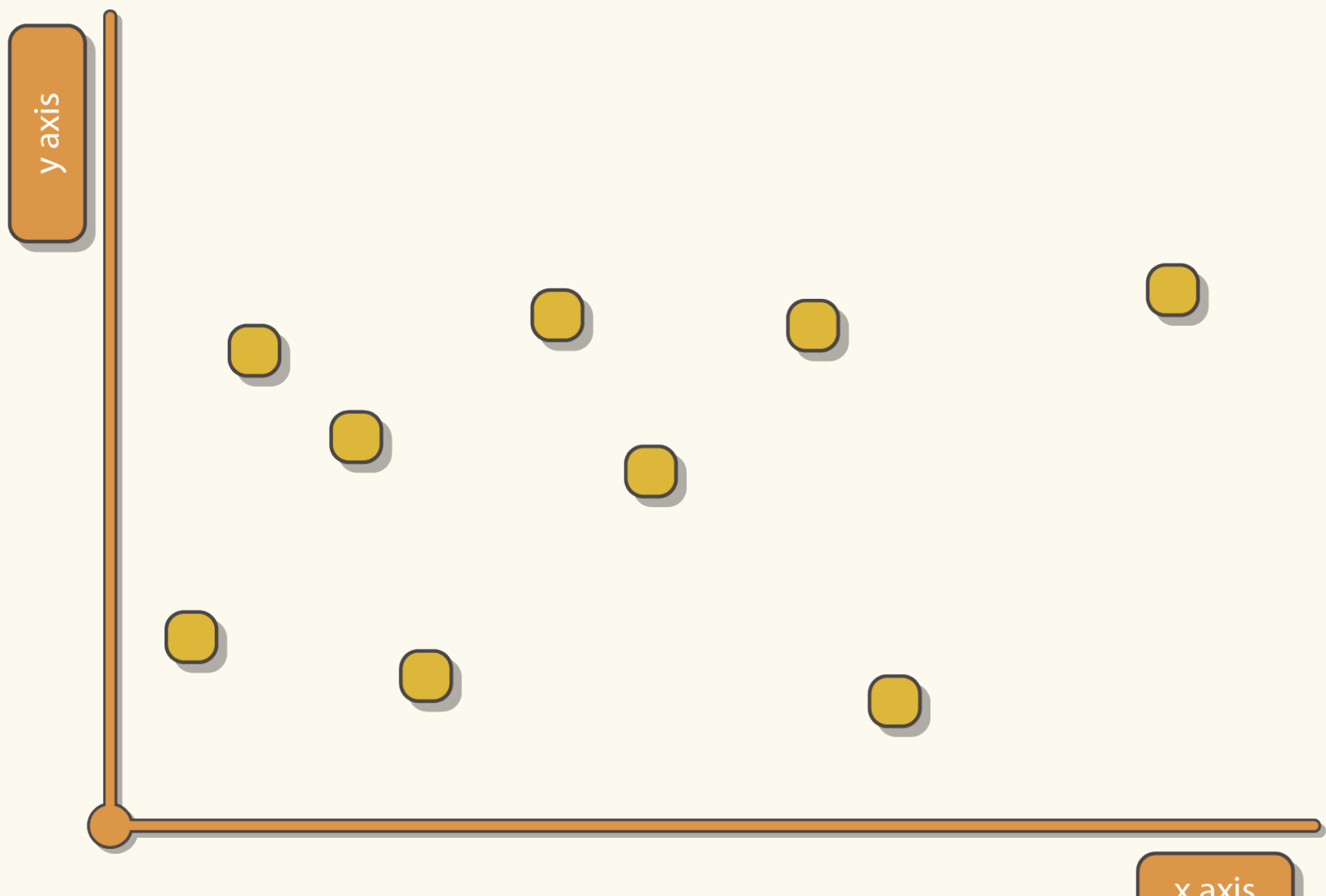


MODERATE NEGATIVE CORRELATION





NO CORRELATION



The correlation coefficient (r)

The correlation coefficient measures the strength of a linear relationship between two variables. It can only take on values between -1 and +1.

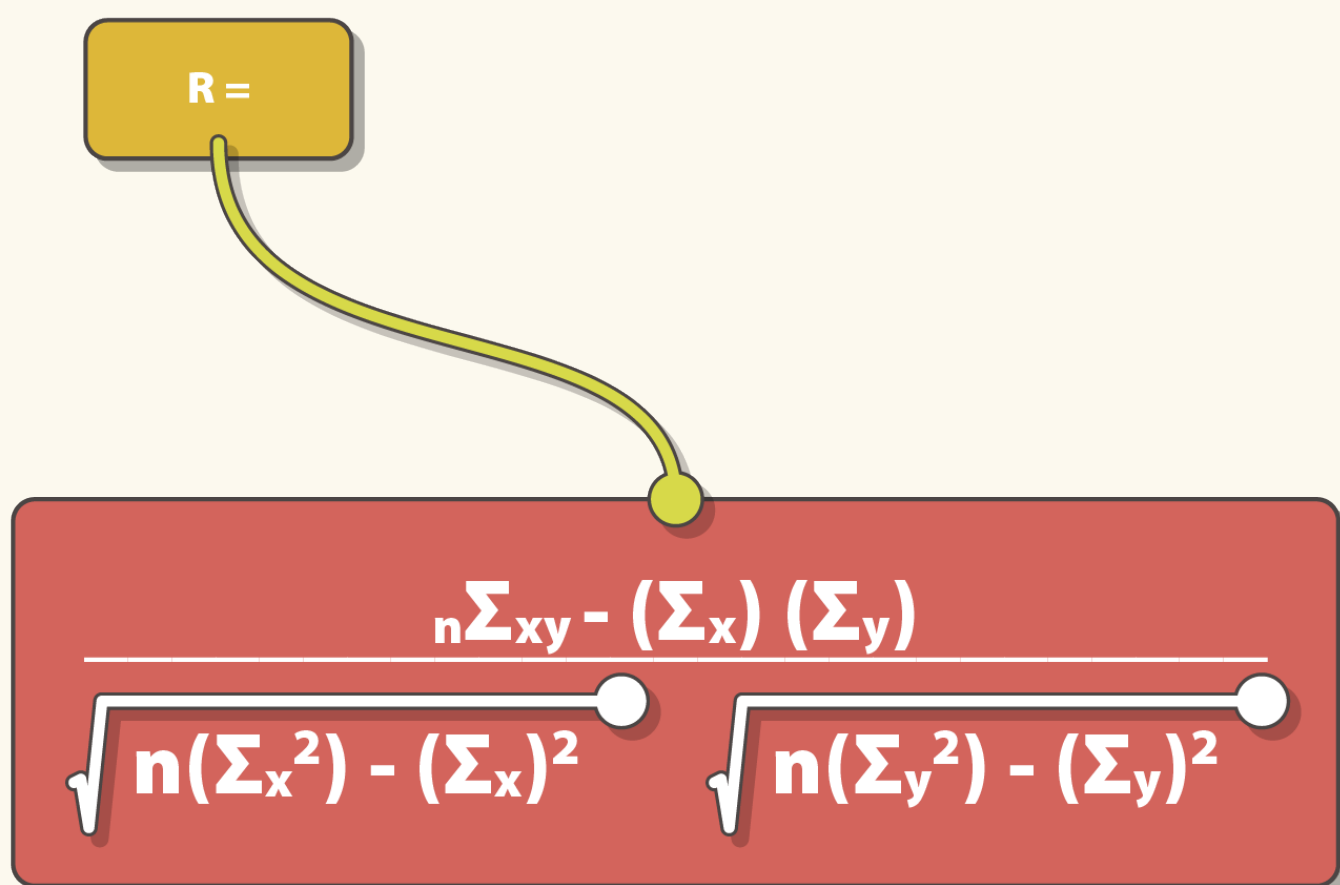
$r = +1$ indicates perfect positive correlation

$r = 0$ indicates no correlation

$r = -1$ indicates perfect negative correlation

The correlation coefficient is calculated as follows

This formula is also given in the exam


$$R = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \sqrt{n(\sum y^2) - (\sum y)^2}}$$

Coefficient of determination (r^2)

The coefficient of determination is the square of the correlation coefficient. It measures how much of the variation in the dependent variable is 'explained' by the variation of the independent variable. The value of r^2 can be between 0 and 1.

For example, if $r = 0.97$, $r^2 = 0.94$ or 94%.

94% of the variation in the dependent variable (y) is due to variations in the independent variable (x). 6% of the variation is due to random fluctuations. Therefore, there is high correlation between the two variables.

Price movements

Historical and forecast data for price movements

An aspect of budgeting which requires great care is the estimation of future costs based on historical figures in an environment of rising prices. When using past accounting data as the basis for forecasting future figures, old costs need to be adjusted to show what they would be at current, or rather at next year's, prices. The Retail Price Index (RPI) is a government produced index used to measure the general rate of price change in the economy.

Linear regression analysis

Advantages of Linear Regression

It provides a more reliable approach to forecasting, as it arrives at the equation of the regression line from the use of mathematical principles, known as the least squares method.

Unlike the high low method, which uses only two past observations, regression analysis can build into the regression line a

large number of observations - this is likely to make the relationship derived more accurate.

Disadvantages of Linear Regression

It is only valid where the relationships involved are linear.

It still uses past data to forecast future values of the variables - if the relationship which existed in the past is not valid for the future, the forecast will be inaccurate.

It is a more complex technique to apply, requiring the mathematical derivation of values for a and b in the regression equation.

Product life cycle

Product life cycle and its importance in forecasting

The product life cycle concept suggests that all products pass through a number of stages from development to decline.

If an organisation knows where a product is in its life cycle, they can use this knowledge to plan the marketing of that product more effectively and, the organisation may be able to derive an approximate forecast of its sales from a knowledge of the current position of a product in its life cycle.

There are limitations of the model, which include

It is over-simplistic to assume that all products comply with a life cycle curve that follows the standard model shown above.

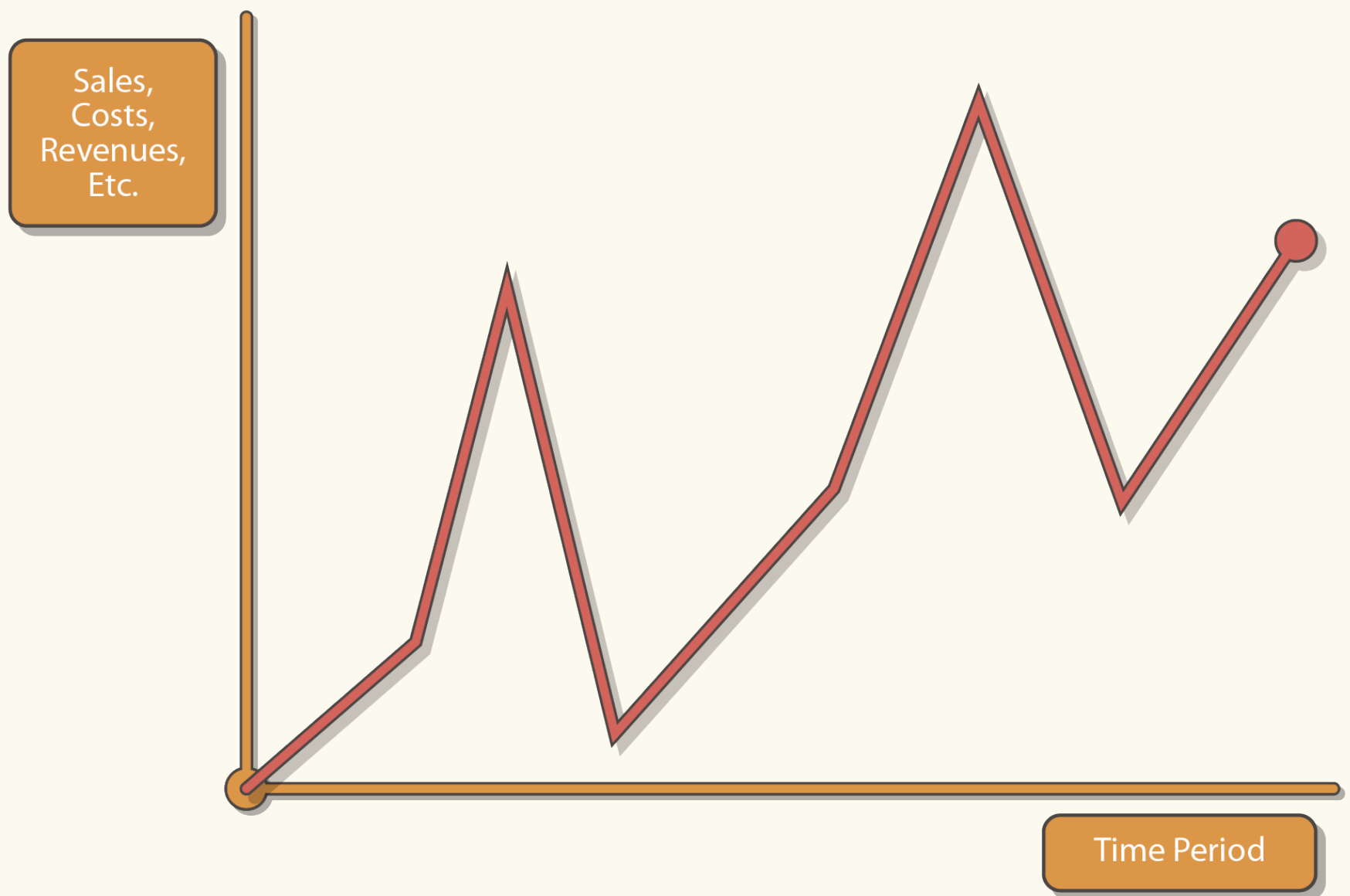
It is difficult for management to establish with precision the position of a product on its cycle curve.

Principles of time series analysis

Time Series

A time series is a series of figures or values recorded over time. The data often conforms to a certain pattern over time. This pattern can be extrapolated into the future and hence forecasts are possible. Time periods may be any measure of time including days, weeks, months and quarters.

A graph of a time series is called a histogram



A time series has four components

a trend is the underlying long-term movement over time in values of data recorded

seasonal variation is fluctuation in values of data recorded over time due to different seasons or periods of the year

seasonal variations or fluctuations are short-term fluctuations in recorded values, due to different circumstances e.g. sales of ice creams will tend to be highest in the summer months

cycles or cyclical variations are medium-term changes in results caused by circumstances which repeat in cycles, e.g. booms and slumps in the economy.

no-recurring, random variations. These may be caused by unforeseen circumstances such as a change in government, a war, technological change or a fire. Hence these are non-repetitive and non-predictable variations.

The actual time series is: -

$$Y = T + S + C + R$$

Where Y = the actual time series

T = the trend series

S = the seasonal component

C = the cyclical component

R = the random component

In the exam, it is unlikely that you will be expected to carry out any calculation of 'C'. Therefore, 'C' will be ignored.

Moving averages

Time series analysis and forecasting

This is carried out in two steps

establishing the long-term underlying trend using moving averages or linear regression. A moving average is an average of the results of a fixed number of periods.

establishing the regular seasonal variations (SV).

Trend and the use of regression coefficients

Trend and Linear Regression Analysis

The trend can be found by linear regression analysis.

Budget forecasts

Trend and Seasonal Variations

Seasonal variations arise in the short-term. It is very important to distinguish between trend and seasonal variation. Seasonal variations must be taken out, to leave a figure which might be taken as indicating the trend (deseasonalised data).

One such method is called moving averages. A moving average is an average of the results of a fixed number of periods, i.e. the mid-point of that particular period.

Please note that when the number of time periods is an even number, we must calculate a moving average of the moving average. This is because the average would lie somewhere between two periods.

Seasonal Variations

These seasonal variations can be estimated using the additive model or the proportional (multiplicative) model.

The additive model

This is based upon the idea that each actual result is made up of two influences.

Actual = Trend + Seasonal Variation (SV) + Random Variations (R)

The SV will be expressed in absolute terms. Please note that the total of the average SV should add up to zero.

The multiplicative model

Actual = Trend × SV factor × Random Variations

The SV will be expressed in proportional terms, e.g. if, in one particular period the underlying trend was known to be \$10,000 and the SV in this period was given as +12%, then the actual result could be forecast as:

$\$10,000 \times 112/100 = \$11,200.$

Please note that the total of the average SV should sum to 4.0, 1.0 for each quarter.

The Time series analysis

Advantages of Time Series Analysis

it is useful when forecasting data which has a regular seasonal pattern as may be the case with sales of certain products

it is a rather simplistic approach

Disadvantages of Time Series Analysis

1. it assumes that past trends will continue indefinitely and that extrapolating data based on historic information will give valid conclusions. In reality, the sales of products may be influenced by the actions of competitors, particularly in relation to new products becoming available on the market.

The purpose of index numbers

What is an index number?

An index number is a technique for comparing, over time, changes in some feature of a group of items (e.g. price, quantity consumed, etc) by expressing the property each year as a percentage of some earlier year.

The year that is used as the initial year for comparison is known as the base year. The base year should also be fairly recent on a regular basis.

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recent on a regular basis.

Types of index numbers

1. Simple Indices

A simple index is one that measures the changes in either price or quantity of a single item in comparison to the base year.

Therefore there are two types of simple indices

A price index – this measures the change in the money value of a group of items over time.

A quantity (volume) index – this measures the change in the non-monetary values of a group of items over time.

The formulae for calculating simple indices are:

Simple price index =

$$\frac{p_n \times 100}{p_0}$$

Simple quantity index=

$$\frac{q_n \times 100}{q_0}$$

Where

p_0 is the price for the base period

p_n is the price for the period under consideration

q_0 is the quantity for the base period

q_n is the quantity for the period under consideration

2. Chain Base Index Numbers

A chain base index number expresses each year's values as a percentage of the value for the previous year.

If a series of index numbers are required for different years, showing the rate of change of the variable from one year to the next, the chain base method is used.

This simply means that each index number is calculated using previous year as base. If the rate of change is increasing, then the index numbers will be rising; if it is constant, the numbers will remain the same and if it is decreasing the numbers will be falling.

Chain base index =

This year's value x 100

Last year's value

3. Composite indices

Composite indices are used when we have more than one item

4. Weighted aggregate Indices

A weighted index involves multiplying each component value by its corresponding weight and adding these products to form an aggregate. This is done for both the base period and the period in question. The aggregate for that period is then divided by the base period aggregate.

Weighted aggregate index =

$$\frac{\sum wv_n}{\sum wv_0}$$

Where:

V_0 is the value of the commodity in the base period

V_n is the value of the commodity in the period in question

Price indices are usually weighted by quantities and quantity indices are usually weighted by prices.

5. Laspeyre, Paasche and Fisher indices

Laspeyre and Paasche indices are special cases of weighted aggregate indices.

Laspeyre index is a multi-item index using weights at the base date. It is sometimes called base weighted index.

Paasche index is a multi-item index using weights at the current date. Hence, the weights are changed every time period.

Fisher's ideal index is found by taking the geometric mean of the Laspeyre index and the Paasche index.

Fisher's ideal index = $\sqrt{(\text{Laspeyre} \times \text{Paasche})}$

Advantages of Indices

Indices present changes in data or information over time in percentage term, i.e. more meaningful information.

The use of indices makes comparison between items of data easier and more meaningful- it is relatively easy to make comparisons and draw conclusions from figures when you are starting from a base of 100.

The ability to calculate separate price and quantity indices, allows management to identify the relative importance of changes in each of two variables. A typical application of this technique is to allow management to identify price and quantity effects and their relative influence on changes in total revenue and total costs.

Disadvantages of Indices

The Laspeyre and Paasche approaches give different results. This suggests that there may be no single correct way of calculating an index, especially the more sophisticated index numbers. The user of the information should bear in mind the basis on which the index is calculated.

The overall result obtained from multi-item index numbers, such as Laspeyre and Paasche are averages - they may hide quite significant variations in changes involved in the component items.

An index number, to be meaningful, should only be applied to the items which are included in the index calculation.

Index numbers are relative values, not absolute figures and may not give the whole picture. For example, Division A has achieved growth of 10% compared to last year while Division B has only achieved 5%. At first glance it may appear that Division A is performing better than Division B. The actual sales figures for the period are \$27,500 for Division A and \$262,500 for Division B. The absolute increase in sales revenue compared to last year is \$2,500 for Division A ($\$2,200/\$25,000 \times 100\% = 10\%$ increase) but \$12,500 for Division B ($\$12,500/\$250,000 \times 100\% = 5\%$ increase)

Simple index numbers

	2010	2011
	\$	\$
product a	2.00	2.25
product b	2.50	2.65
product c	3.50	3.00

A simple aggregate price index would be calculated:

$$\Sigma p_0 = 2 + 2.50 + 3.50 = \$8.0$$

$$\Sigma p_n = 2.25 + 2.65 + 3.00 = \$7.90$$

year	$\Sigma p_n / \Sigma p_0$	simple aggregate price index
2010	$8 / 8 = 1.0$	100
2011	$7.9 / 8 = 0.987$	99

This index ignores the amounts of each product which was consumed. To overcome these problems, we can use a weighting which is an indicator of the importance of the component

Computer spreadsheet system

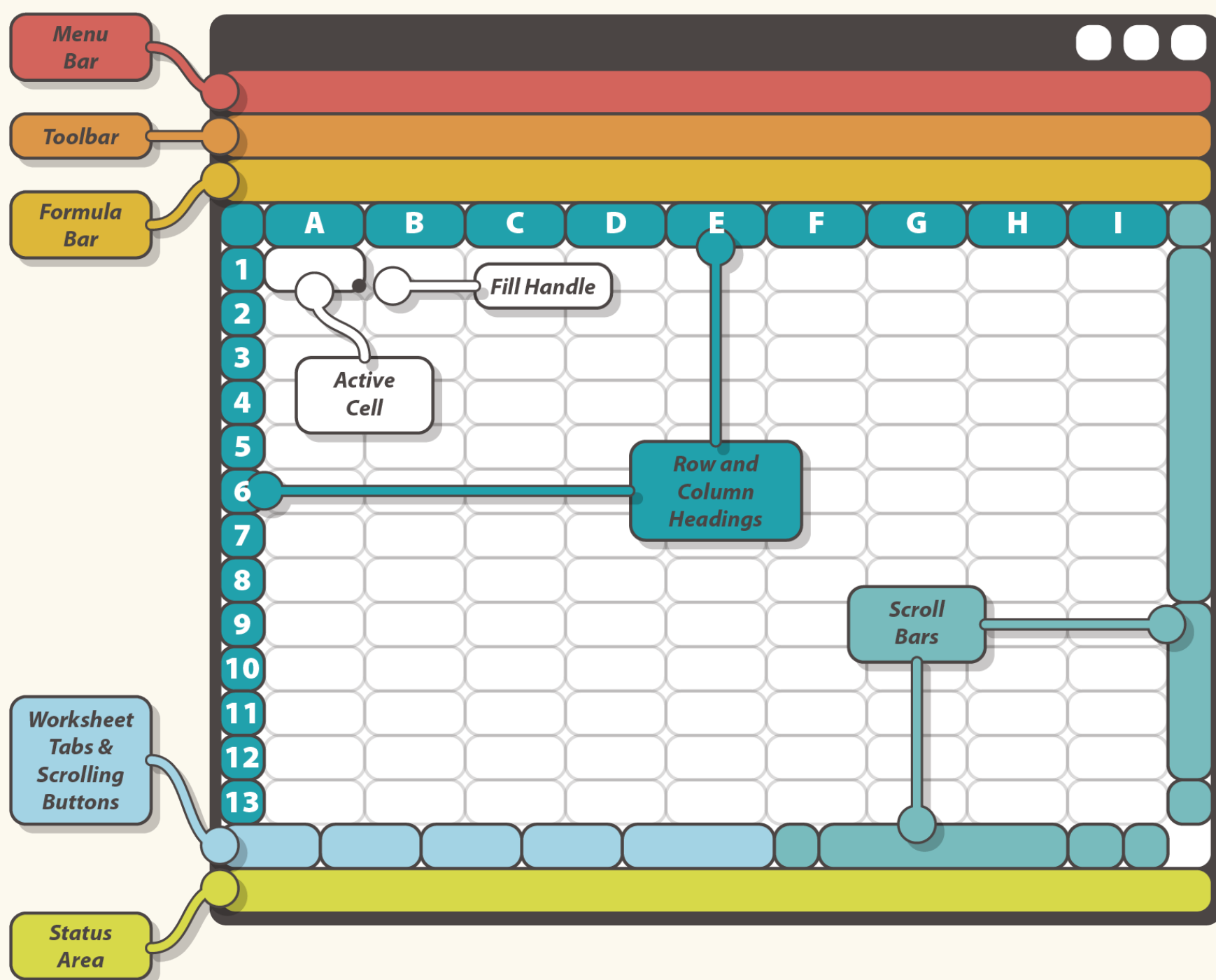
The role and features of a computer spreadsheet system

Most of the numerical forecasting and budgeting techniques mentioned in the previous chapters will be carried out far more efficiently with the help of computer software packages. Packages have specific statistical applications (index numbers, time series analysis, regression) but they can also be of a more general nature (e.g. spreadsheets and databases).

What is a spreadsheet?

A spreadsheet is a computer package which is divided into rows and columns. The intersection of a row and a column is known as a cell.

	A	B	C	D	E	F	G	H
1								
2		January	February	March	April	May	Totals	%’s
3	Widgets	98	39	40	140	240		
4	Figets	122	18	50	150	250		
5	Digets	56	52	60	160	260		
6								
7	Totals							



The contents of any cell can be one of the following

Text. A text cell usually contains words, descriptions, key words.

Values. A value is a number that can be used in a calculation.

Formulae. A formula refers to other cells in the spreadsheet, and performs some sort of computation with them.

Formula bar

The formula bar allows you to see and edit the contents of the active cell. The bar also shows the cell address of the active cell.

STEP 2

Insert "=" sign, then put the values or cells you want to calculate
Such as: =100+250+345 or =B4*C4

STEP 1

Click on the cell you want

	A	B	C	D	E
1	Item Price				
2					
3	Item	Price	Quantity	Subtotal	
4	#001	\$2.54	5		
5	#002	\$3.48	6		
6	#003	\$5.12	3		
7	#004	\$4.02	4		
8	#005	\$1.22	9		
9					
10					

Examples of spreadsheet formulae

All Excel formulae start with the equals sign =, followed by the elements to be calculated (the operands) and the calculation operators. Each operand can be a value that does not change (a constant value), a cell or range reference, a label, a name, or a worksheet function.

Formulae can be used to perform a variety of calculations. Here are some examples

1. =C4*5. This formula multiplies the value in C4 by 5. The result will appear in the cell holding the formula.
2. =C4*B10. This multiplies the value in C4 by the value in B10.
3. =C4/E5. This divides the value in C4 by the value in E5.
4. =C4*B10-D1. This multiplies the value in C4 by that in B10 and then subtracts the value in D1 from the result.

Note that generally Excel will perform multiplication and division before addition or subtraction

5. =C4*117.5%. This adds 17.5% to the value in C4, for example in sales tax.
6. = (C4+C5+C6)/3. Note that the brackets mean Excel would perform the addition first.

Without the brackets

Excel would first divide the value in C6 by 3 and then add the result to the total of the values in C4 and C5.

2^2 gives you 2 to the power of 2, in other words 22. Likewise $= 2^3$ gives you 2 cubed and so on.

$= 4^{(1/2)}$ gives you the square root of 4. Likewise $27^{(1/3)}$ gives you the cube root of 27 and so on.

Formulae with conditions

< less than

= greater than or equal to

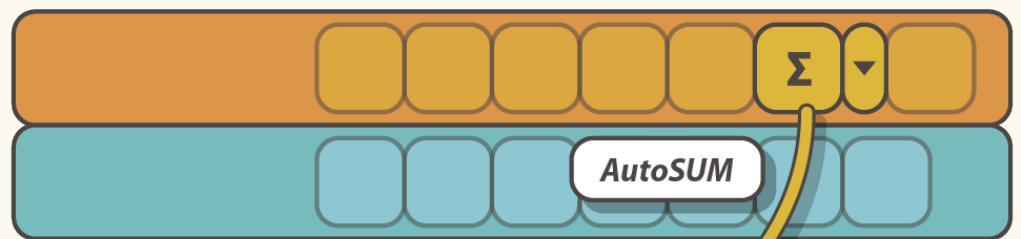
> greater than

not equal to

The SUM button Σ

In Excel, the standard toolbar has a button Σ that simplifies adding a column or row of numbers. When you click the AutoSum button, Excel creates a sum function for the column of numbers directly above or the row of numbers to the left. Excel pastes the SUM() function and the range to sum into the formula bar.

Using the AutoSUM button
on the standard toolbar



	A	B	C	D	E
1	1st Quarter Sales				
2					
3		January	February	March	
4	Sales Revenue:				
5	Peanut Butter	\$1,292	\$1,156	\$1,250	
6	Chocolate Chip	\$2,047	\$1,987	\$1,156	
7	Oatmeal Raisin	\$1,795	\$2,010	\$1,892	
8	Lemon	\$1,250	\$1,345	\$1,292	
9	Total Revenues:	\$6,384	=SUM(C9:C12)		
10			SUM(number1, [number2])		

Applications for computer spreadsheets

Uses of spreadsheets

Spreadsheets provide a tool for calculating, analysing and manipulating numerical data. Spreadsheets make the calculation and manipulation of data easier and quicker.

For example, the spreadsheet above has been set up to calculate the totals automatically. If you changed your estimate of sales for one of the departments, the totals will change automatically.

Spreadsheets can be used for a wide range of tasks due to its ability to manipulate a large amount of data very quickly to answer 'what-if' questions.. Some common applications of spreadsheets are

Management accounts

Revenue analysis and comparison

Cost analysis and comparison

Budgets and forecasts

'What if?' analysis / sensitivity analysis

Cash flow analysis and forecasting

Reconciliations

Advantages of spreadsheets

easy to learn and use

easier and quicker calculation and manipulation of data

enable 'what-if' analysis to be performed quickly

enable the analysis, reporting and sharing of financial information

Disadvantages of spreadsheets

since formulae are hidden, the underlying logic of a set of calculations may not be obvious.

a high proportion of large models contain errors

a database may be more suitable to use with large volumes of data

Budget Preparation

Principal budget factor

The importance of principal budget factor in constructing the budget

As described in the budgeting process, in every organisation, there is some factor that restricts performance for a given period. This factor is known as the principal budget factor or limiting factor. In the majority of organisations, this factor is sales demand but it can also be shortage of materials or inadequate plant capacity.

Decisions must be taken at an early stage to minimize the impact of any principal budget factor. Once this factor has been identified and individual functional budgets are being set, it is important to ensure that coordination of functions takes place. For example, it would not make sense to set a sales budget with a sales volume in excess of exiting plant capacity, unless decisions were made on improving capacity, subcontracting work or cutting back on the sales budget.

Sales & Functional budgets

Functional budget

A functional budget is a budget of income and/or expenditure which applies to a particular function. The main functional budgets are:

Sales budget

Production budget

Research and development budget

Raw material usage budget

Raw material purchases budget

Labour budget

Overheads budget

Sales Budget

A sales budget can be prepared both in units and in value

Production Budget

Budgeted production levels can be calculated as follows: -

Budgeted production =

Forecast sales + closing inventory of finished goods – opening inventory of finished goods

Material Budget

Material usage budget

Material usage =

Budgeted production for each product x the quantity required to produce one unit of the product

Material purchases budget

Material purchases budget =

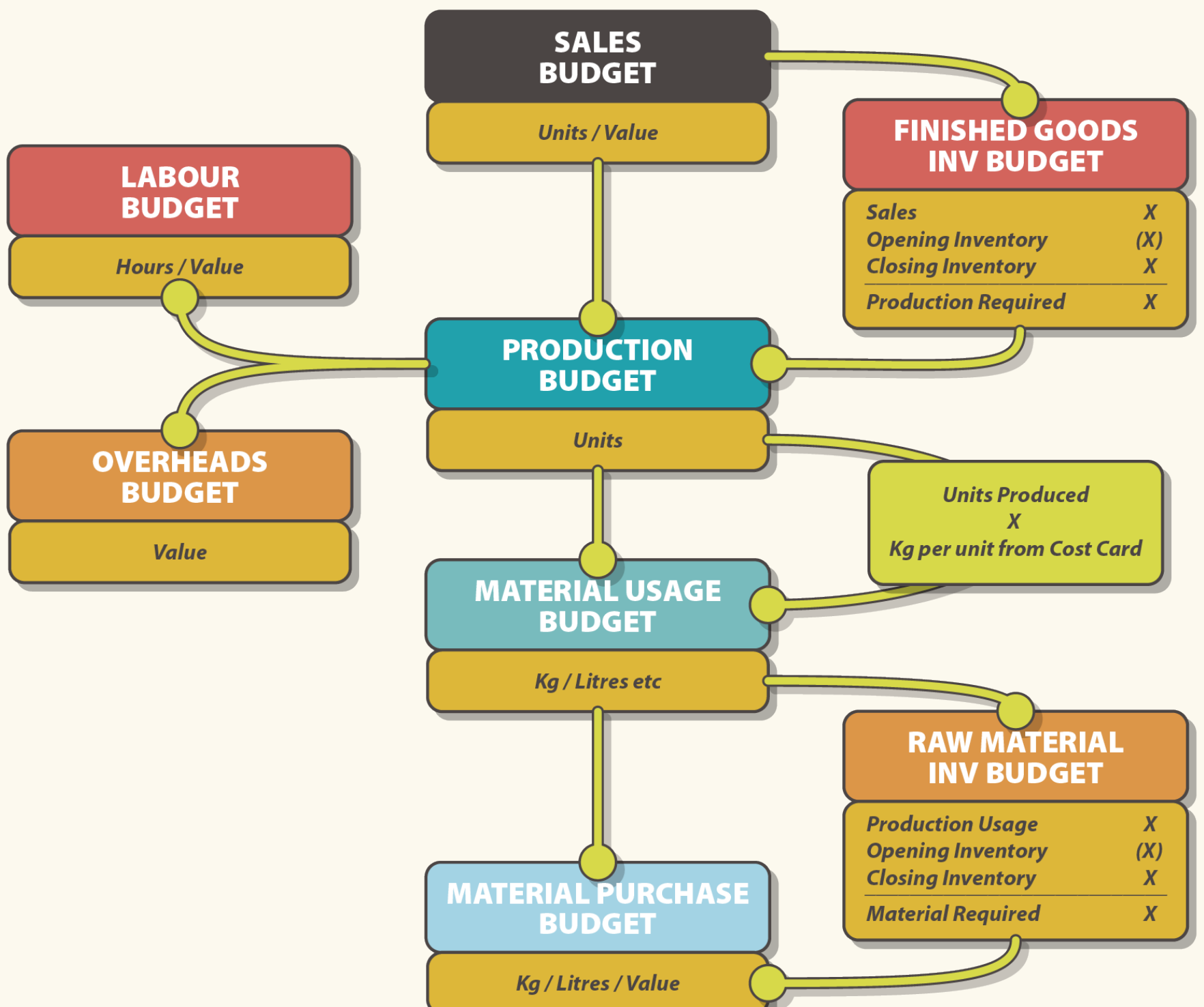
Material usage budget + closing inventory – opening inventory

Labour Budget

Labour budget = no. of hours x labour rate per hour

Overhead Budget

The overhead budget will be made up of variable costs and fixed costs



Cash budgets

Cash budgets are vital to the management of cash. They show the expected inflows and outflows of cash through the company. They help to show cash surpluses and cash shortages.

It is especially important to maintain a cash balance necessary to meet ongoing obligations. However, holding cash carries with it a cost – the opportunity cost of the profits which could be made if the cash was either used in the company or invested elsewhere. Cash management is therefore concerned with optimising the amount of cash available to the company and maximising the interest on any spare funds not required immediately by the company.

Management can therefore use cash budgets to plan ahead to meet those eventualities – arranging borrowing when a deficit is forecast, or buying short-term securities during times of excess cash.

Master budgets

Prepare master budgets

When all the functional budgets have been prepared, they are summarized and consolidated into a master budget which consists of

1. Budgeted income statement
2. Budgeted statement of financial position
3. Cash budget

‘What if’ analysis and scenario planning

What If Analysis

‘What if’ analysis is a form of sensitivity analysis which allows the effects of changing one or more data values to be quickly recalculated. It enables each of the input values to be changed both individually and in combination to see the effects on the final result.

ffects on the final result.

Scenario Planning

Scenario planning has proved to be a very useful tool in budgeting. Scenarios describe the relevant future environments in which the business may have to operate. The scenarios are supported by a business model that reflects the essence of these scenarios.

The Scenario Planning Process

1. Identify the fundamental business question or issue that the business wishes to address
2. Identify the critical factors to answer the business question
3. Identify the current and future variables that may impact the critical factors
4. Generate scenarios
5. Add more detail to these scenarios
6. The scenarios can now be re-created within a business model
7. Once the scenario planning process has been completed, there is a full, analytical description of potential alternatives in which the business may operate and finally to make strategic choices

Flexible Budgets

Flexible budgets in control

Budgetary control involves controlling costs by comparing the budget with the actual results and investigating any significant differences between the two. Any differences (variances) are made the responsibility of key individuals who can either exercise control action or revise the original budgets.

If this control process is to be valid and effective, it is important that the variances are calculated in a meaningful way. One of the major concerns is to ensure that the budgeted and actual figures reflect the same activity level.

Flexible Budgets

A flexible budget is a budget that adjusts or flexes for changes in the volume of activity. The flexible budget is more sophisticated and useful than a fixed budget, which remains at one amount regardless of the volume of activity.

For example, a firm may have prepared a fixed budget at a sales level of \$100,000. Flexible budgets may be prepared at different activity levels e.g. anticipated activity 100% and also 90%, 95%, 105% and 110% activity. Flexible budgets can be useful but time and effort is needed to prepare them.

Disadvantages of fixed budgets

Fixed Budgets

A fixed budget is a budget which is normally set prior to the start of an accounting period, and which is not changed in response to changes in activity or costs/revenues. It is produced for a single level of activity, i.e. based on estimated production.

Comparison of a fixed budget with the actual results for a different level of activity is of little use for budgetary control purposes. This is because we will not really be comparing like with like.

Fixed or flexible budgetary control

Flexed Budgets

A flexed budget is a budget prepared to show the revenues, costs and profits that should have been expected from the actual level of production and sales.

If the flexed budget is compared with the actual results for a period, variances will be much more meaningful.

The high-low method may have to be used in order to determine the fixed and variable elements of semi-variable costs. However, please note that fixed costs remain unchanged regardless of the level of activity and should not be flexed.

Flex a budget

Capital budgeting and discounted cash flow

Capital investment planning and control

The importance of capital investment planning and control

Capital investment involves expenditure on non-current assets for use in a project which is intended to provide a return by way of interest, dividends or capital appreciation. Capital investment decisions are crucial to the running of a business in the long term. It affects the following areas

1. Growth

Without capital investment companies cannot grow and expand. The decisions made affect the long term.

If the wrong capital investment decisions are done, then this can burden a company unnecessarily. However a company must invest in order to maintain its market share and hopefully grow.

2. Risk

Capital investment is a long term investment. It requires long term funding. This long term commitment brings with it risks; e.g. the risks of defaulting on the financing. However, the potential gains made from the investment may fluctuate more than the previous gains made by the business. Such fluctuations make the company more risky.

3. Funding

Capital investment is often a large amount - this means the company will need to look for finance, both internally and externally. The choice of finance type is crucial, as it needs to be appropriate for the investment type and the company at the time

4. Complexity

Investment decisions are often based on future estimates, often in many years time. Estimates and variables are used which are often interrelated.

The estimates and variables will also change over time due to changes in the environment in which the company operates (economic, political, social, technological, environmental and legal).

Capital and revenue expenditure

Capital Expenditure

Capital expenditure can be defined as expenditure on productive assets which are intended for use on a continuing basis in an enterprise's activities, e.g. non-current assets such as buildings, lifts, heating, machinery, vehicles, and office equipment. This can be for expansion and/or to improve quality for profitability purposes.

Capital expenditure appears as a non-current asset in the statement of financial position. Depreciation is charged in the income statement as an expense.

All the costs incurred in self constructed assets (a business builds its own non-current asset) should be included as a non-current asset in the statement of financial position.

Revenue Expenditure

This expenditure is on day to day items, i.e. where the benefit is received short term. This includes salaries, telephone costs or rent. It is incurred for the purpose of trade, i.e. for expenditure classified as selling and distribution expenses, administration expenses and fixed charges or to maintain the existing earning capacity of non-current assets.

Revenue expenditure is included as an expense in the period in which it is incurred

Capital Income

Capital income is the proceeds from the sale of non-current assets and non-current asset investments

Revenue Income

Revenue income is derived from the sale of trading assets and from interest and dividends received from investments held by the business.

Capital expenditure budget

Issues to consider re capital expenditure

The quality of management decisions relating to the acquisition of non-current assets will affect the level of profitability in a business. Once acquired, assets must be used effectively. A profitable rate of return must be obtained to justify the continued use of these assets and audit should be carried out to check that the expected benefits have been realized.

Steps involved in the preparation of a capital expenditure budget

Step1: Identify investment required

The case for the expenditure should be summarised, preferably on a standard form, giving details of the equipment, etc, required, the anticipated cost and estimates of any internal materials or labour required for installation

required, the anticipated cost and estimates of any internal materials or labour required for installation.

Step 2: Evaluate capital expenditure

The data presented should then be evaluated by the accounts department following the approach adopted by the organisation. This approach may range from a simple payback assessment, i.e. how quickly will the investment be paid back from the profits arising, to more sophisticated procedures allowing for the time-value of money. These methods will be described later on in this chapter.

Step 3: Authorise capital expenditure and disposal

Very large proposals may require approval by the board of directors, while smaller proposals may be approved at divisional level

Step 4: Implement, monitor and review investments

The time required to implement the investment proposal or project will depend on its size and complexity. Following implementation, the investment project must be monitored to ensure that the expected results are being achieved and the performance is as expected: - this is known as post-completion audit. The whole of the investment decision-making process should also be reviewed in order to facilitate organisational learning and to improve future investment decisions.

Simple and compound interest

Simple interest

Simple interest is calculated on the original principal only.

Example

You invest \$100 for 3 years and you receive a simple interest rate of 10% a year on the \$100. This would be \$10 each year. Simply $\$100 \times 10\% = \10 .

Compound interest

The important thing to remember is that you get interest on top of the previous interest. This is called compound interest.

Example

Suppose that a business has \$100 to invest and wants to earn a return of 10%. What is the future value at the end of each year using compound interest?

Yr 1 - $100 \times 1.10 = \$110$

Yr 2 - $110 \times 1.10 = \$121$ or $100 \times (1.10)^2$

Yr 3 - $121 \times 1.10 = \$133$ or $100 \times (1.10)^3$

This future value can be calculated as:

$$FV = PV (1+r)^n$$

Where

FV is the future value of the investment with interest

PV is the initial or 'present' value of the investment

r is the compound annual rate of return or rate of interest expressed as a proportion

n is the number of years

e.g. $(100 \times 1.1)^3 = 133$

Nominal interest rate

The nominal interest rate is given as a percentage. A compounding period is also given. In the above example, the 10% is the nominal rate and the compounding period is a year.

The compounding period is important when comparing two nominal interest rates, for example 10% compounded semi-annually is better than 10% compounded annually. In the exam, unless told otherwise, presume the compounding period is a year.

Effective annual rate of interest (annual percentage rate – APR)

The effective interest rate, on the other hand, can be compared with another effective rate as it takes into account the compounding period automatically. and expresses the percentage as an annual figure.

Compounding period automatically, and expresses the percentage as an annual figure.

In fact, when interest is compounded annually the nominal interest rate equals the effective interest rate.

To convert a nominal interest rate to an effective interest rate, you apply the formula:

$$= (1 + i/m)^{mt} - 1$$

Where 'm' is the number of compound periods

'i' is the interest rate

't' is the number of time periods

Example

What is the effective rate of return of a 15% p.a. monthly compounding investment?

$$\text{Effective rate} = (1 + (0.15/12))^{12} - 1 = (1 + 0.0125)^{12} - 1 = 0.1608 = 16.08\%$$

Example

What effective rate will a stated annual rate of 6% p.a. yield when compounded semi-annually?

$$\text{Effective Rate} = (1 + (0.06/2))^2 - 1 = 0.0609 = 6.09\%$$

Compounding and discounting

Compounding

We have already looked at compounding in previous section. Just a reminder that the formula for compounding is: -

$$FV = PV (1+r)^n$$

Discounting

Discounting is compounding in reverse. It starts with a future amount of cash and converts it into a present value.

A present value is the amount that would need to be invested now to earn the future cash flow, if the money is invested at the 'cost of capital'.

Hence, when looking at whether we should invest in something we will be looking at future cash flows coming in. We want to know what these future cash flows are worth now, in today's money ideally.

PV =

FV

$(1 + r)^n$ If the future value is in one year's time, then you take this FV and multiply it by 1/interest rate (discount rate)

Example

A business is to receive \$100 in one year's time and the interest rate/discount rate is 10%. What is the PV of that money?

$PV = 100 / 1.10$

PV = \$90.9

Example

A business is to receive \$100 in two years' time and the interest rate/discount rate is 10%. What is the PV of that money?

$PV = 100 / 1.10^2$

PV = \$82.6

Discount Rate

The present value can also be calculated using a discount factor (saving all the dividing by 1.1 etc.)

The discount factor can be calculated as $1 / (1+r)^n$ to the power of n

So, the discount factor for 10% in 3 years is:

$1 / 1.13 = 0.751$

So $133 \times 0.751 = \$100$

There are also tables that give you a list of these 'discount factors' – a copy of these tables is included at the end of these notes.

Hence, to calculate a present value for a future cash flow, you simply multiply the future cash flow by the appropriate

hence, to calculate a present value for a future cash flow, you simply multiply the future cash flow by the appropriate discount factor.

Cash flow and profit

The distinction between cash flow and profit and the relevance of cash flow to capital investment appraisal

Let's say you buy some goods for \$100 and sell them for \$200. However, \$80 of the receipt is on credit and you have not received it yet.

Profit looks solely at the income and costs. It matches these together, regardless of timing of the actual cash payment or receipt.

Sales \$200

Costs (100)

Profit 100

Cash flow, on the other hand, does not attempt to match the sale with the cost but rather the actual cash paid and received.

Cash received \$120

Cash paid (100)

Increase in Cash flow 20

Therefore, cash flows look at when the amounts actually come in and out: - the money actually spent, saved and received. This is vital to capital investment decision making - as the timing of inflows and outflows have a value too - the time value of money.

Not only should the timing of the cash flows be taken into account when planning on investments but also the type of cash flows to include. We call these relevant costs.

Relevant cash flows

Relevant cash flows for individual investment

Relevant costs are those whose inclusion affects the investment decision.

The cash flows that should be included in a capital budgeting analysis are those that will only occur if the project is accepted

You should always ask yourself "Will this cash flow change ONLY if we accept the project?"

– If the answer is "yes," it should be included in the analysis because it is incremental

Hence, the only cash flows that should be taken into consideration in capital investment appraisal are

Future (ignore past / sunk costs)

Incremental (A cost that would have been paid anyway can be ignored. Examples of relevant incremental costs include repair costs arising from use, hire charges and any fall in the resale value of owned assets which results from their use)

Cash (Accounting items like depreciation ignore as they are not cash)

An opportunity cost (the value of a benefit foregone a result of choosing a particular course of action) is always a relevant cost.

Net present value (NPV) and Internal rate of return (IRR)

Discounted cash flow, or DCF, is an investment appraisal technique that takes into account both the timing of cash flows and also the total cash flows over a project's life.

Net Present Value

The NPV is the value obtained by discounting all the cash outflows and inflows for the project capital at the cost of capital and adding them up. Hence, it is the sum of the present value of all the cash inflows from a project minus the PV of all the cash outflows.

NPV is positive – the cash inflows from a capital investment will yield a return in excess of the cost of capital. The project is financially attractive

NPV is negative – the cash inflows from a capital investment will yield a return below the cost of capital. From a financial perspective, the project is therefore unattractive.

NPV is exactly zero - the cash inflows from a capital investment will yield a return exactly equal to the cost of capital. The project is therefore just about financially attractive.

If a company has 2 projects under consideration it should choose the one with the highest NPV.

Internal Rate of Return

The internal rate of return (IRR) is essentially the discount rate where the initial cash out (the investment) is equal to the PV of the cash in. So, it is the discount rate where the NPV = 0. If the IRR is higher than a target rate of return, the project is financially worth undertaking.

Consequently, to work out the IRR we need to do trial and error NPV calculations, using different discount rates, to try and find the discount rate where the NPV = 0. This is known as the interpolation method.

The steps in this method are: -

Step 1: - Calculate two NPV for the project at two different costs of capital. It is important to find two costs of capital for which the NPV is close to 0, because the IRR will be a value close to them.

Step 2: - Having found two costs of capital where the NPV is close to 0, we can then estimate the cost of capital at which the NPV is 0, i.e. the IRR. A formula is used

$$\frac{L + \text{NPV L}}{\text{NPV L} - \text{NPV H}} \times (H - L)$$

L = Lower discount rate

H = Higher discount rate

NPV L = NPV @ lower rate

NPV H = NPV @ higher rate

Mutually Exclusive Investments

The rule for deciding between mutually exclusive projects is to accept the project with the higher NPV.

Annuity and perpetuity formulae

Annuity

An annuity is a fixed (constant) periodic payment or receipt which continues either for a specified time or until the occurrence of a specified event, e.g. ground rent.

Example

\$100 will be received at the end of every year for the next 3 years. If cost of capital is 10%, what is the PV of these amounts together?

Strictly speaking it is:

$$\text{Yr 1 } 100 / 1.1 = 91$$

$$\text{Yr 2 } 100/1.1/1.1 = 83$$

$$\text{Yr 3 } 100/1.1/1.1/1.1 = 75$$

$$\text{All added together} = \$249$$

This is easier is to calculate using an annuity discount factor - this is simply the 3 different discount factors above added together

So using normal discount factors:

$$\text{Yr 1 } 1/1.1 = 0.909$$

$$\text{Yr 2 } 1/1.1/1.1 = 0.826$$

$$\text{Yr 3 } 1/1.1/1.1/1.1 = 0.751$$

$$\text{All added together } 2.486 = \text{Annuity factor (or get from annuity table)}$$

$$\text{So } \$100 \times 2.486 = 248.6 = 249$$

Perpetuity

Perpetuity is a periodic payment or receipt continuing for a limitless period.

Calculating the PV of a perpetuity:

Cash flow

Interest rate

Worked Example

What is the present value of an annual income of \$50,000 for the foreseeable future, given an interest rate of 5%?

$$50,000 / 0.05 = \$1,000,000$$

Payback

Payback Period (non discounted)

The payback period is the length of time that it takes for a project to recoup its initial cost out of the cash receipts that it generates. This period is sometimes referred to as "the time that it takes for an investment to pay for itself."

The basic premise of the payback method is that the more quickly the cost of an investment can be recovered, the more desirable is the investment. Hence, this method focuses on liquidity.

The payback period is expressed in years. When the net annual cash inflow is the same every year, the following formula can be used to calculate the payback period.

Formula / Equation:

The formula or equation for the calculation of payback period is as follows:

Payback period = Investment required / Net annual cash inflow*

*If new equipment is replacing old equipment, this becomes incremental net annual cash inflow.

Example - Constant Cash Flow

Initial cost 3.6 million

Cash in annually 700,000

What is the payback period?

$3,600,000 / 700,000 = 5.1429$ years

Take the decimal (0.1429) and multiply it by 12 to get the months - in this case 1.7 months

So the answer is 5 years and 1.7 months

Example - Irregular Cash Flows

When the cash flows associated with an investment project change from year to year, the simple payback formula that we outlined earlier cannot be used. To understand this point, consider the following data:

year 0 - capital out	(800)	-800
year 1 - cash in	100	-700
year 2 - cash in	240	-460
year 3 - cash in	200	-260
year 4 - cash in	250	-10
year 5 - cash in	120	+110

When the cumulative cashflow becomes positive then this is when the initial payment has been repaid and so is the payback period

So in the final year we need to make \$10 more to recoup the initial 800. So, that's \$10 out of \$120. $10/120 \times 12$ (number of months) = 1.

So the answer is 4 years 1 month.

Payback Period (discounted)

The payback period incorporates the time value of money into the payback method. All the cash flows are discounted at the company's cost of capital. The discounted payback period is therefore the time it will take before the project's cumulative NPV becomes positive.

Interpreting the results

Budgetary control and reporting

Simple variances

Relative significance of variances

Potential action to eliminate variances

Responsibility accounting

The concept of responsibility accounting and its significance in control

Budgetary control and responsibility accounting are seen to be inseparable.

Each manager must have a well-defined area of responsibility and the authority to make decisions within that area. This is known as a responsibility accounting unit. An area of responsibility may be structured as

1. a cost centre – the manager is responsible for cost control only
2. a revenue centre – the manager is responsible for revenues only
3. profit centre – the manager has control over costs and revenues
4. investment centre – the manager is empowered to take decisions about capital investment for his department. Later on, we will be discussing two measures of performance in investment centres: return on investment and residual income

A common problem is that the responsibility for a particular cost or item is shared between two (or more) managers. For e.g. the responsibility for material costs will be shared between production and purchasing managers. It is important that the reporting system should be designed so that the responsibility for performance achievements is identified as that of a single manager.

Controllable and uncontrollable costs

The main problem with measuring performance is in deciding which costs are controllable and which costs are traceable. The performance of a manager is indicated by the controllable profit and the success of the division as a whole is judged on the traceable profit.

Controllable costs and revenues are those costs and revenues which result from decisions within the authority of a particular manager within the organization. These should be used to assess the performance of the managers.

For example, depreciation on machinery in Division A is a traceable fixed cost because profit centre managers do not have control over the investment in non-current assets.

Most variable costs are controllable in the short term because managers can influence the efficiency with which resources are used.

Some costs are non-controllable, such as increases in expenditure items due to inflation. Other costs are controllable in the long term rather than the short term. For example, production costs might be lower by the introduction of new machinery. However, its results will be seen in the long term.

Control reports

The following control report will be presented only to the responsible manager. It will include a number of recommendations how any variance will be controlled or eliminated.

	Budget		Actual		Variance	
	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date
Managing Director						
Factory A						
Factory B						
Administration Costs						
Selling Costs						
Distribution Costs						
R&D Costs						
Production Director						
Factory A						
Machining Department						
Casting Department						
Assembly Department						
Inspection and Quality Control						
Factory Manager's Office						
Head of Machining						
Department						
Direct Materials						
Direct Labour						
Indirect Labour						
Power						
Maintenance						
Other						

Behavioural aspects of budgets

Motivation in performance management

Introduction

The purpose of a budgetary control system is to assist management in planning and controlling the resources of their organisation by providing appropriate control information. The information will only be valuable, however, if it is interpreted correctly and used purposefully by managers and employees. The correct use of control information therefore depends not only on the content of the information itself, but also on the behaviour of its recipients.

A number of behavioural problems can arise

1. The managers who set the budget or standards are often not the managers who are then made responsible for achieving budget targets.
2. The goals of the organisation as a whole, as expressed in a budget, may not coincide with the personal aspirations of individual managers. This is known as dysfunctional behaviour.
3. When setting the budget, there may be budgetary slack (or bias). Budget slack is a deliberate over-estimation of expenditure and/or under-estimation of revenues in the budgeting process. This results in a budget that is poor for control purposes and meaningless variances.

The importance of motivation in performance management

Motivation is the drive or urge to achieve an end result. Hence, if employees and managers are not motivated, they will lack the drive or urge to improve their performance and to help the organization to achieve its goals and move forward.

The management accountant should therefore try to ensure that employees have positive attitudes towards setting budgets, implementing budgets and feedback of results.

Factors such as financial and non financial rewards, prestige and esteem, job security and job satisfaction may all play a part to motivate management and employees.

Influencing motivation

Factors in a budgetary planning and control system that influence motivation

Management accounting planning and control systems can have a significant effect on manager and employee motivation.

These include

The level at which budgets and performance targets are set

Manager and employee reward systems

The extent to which employees participate in the budget setting process

Targets upon motivation

The impact of targets upon motivation

A budget represents a target, and aiming towards a target can be a powerful motivator. However, whether the target will actually cause employees to do better is thought to depend on how difficult the target is perceived to be.

Employees have different perceptions of targets, but generally it is thought that

if targets are very low, actual performance can be pulled down from where it might naturally have been

if targets are habitually very high, then employees might give up and, again, performance can be reduced – if you know that no matter how hard you try you will fail to meet the target, it's easy to conclude that you might as well not try at all.

Aim to set budgets

So, the aim is to set budgets which are perceived as being possible, but which entice employees to try harder than they otherwise might have done. The concept of a 'motivating budget' is a powerful one, although the budget which is best for motivating might not represent the results which are actually expected. Managers can, and perhaps should, build in a margin for noble failure.

The relationship between budget difficulty and actual performance is typically represented in Figure 1, which shows the following

When the budget is very easy, actual performance is low. It has been pulled down by the low demands made of employees.

When the budget is very difficult, actual performance is low. Why try when you are doomed to failure?

When a budget is set at the level of the expectations (the best estimate of what performance will actually be), employees are likely to perform as expected.

If a more difficult aspirational budget is set, employees will try harder, and if the budget is judged just right then their actual performance will be at its maximum, though often falling short of the budget.

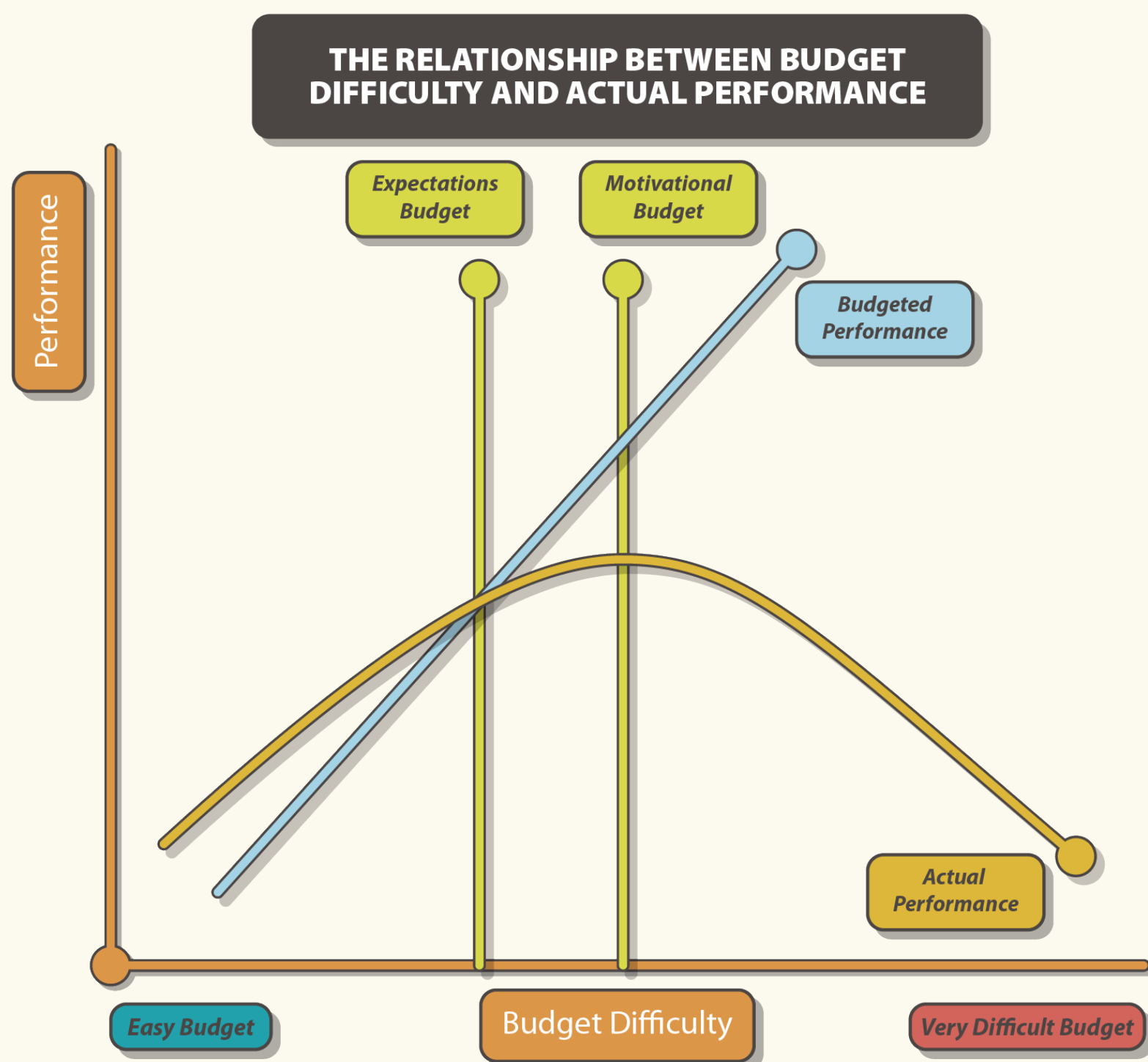


FIGURE 1 : THE RELATIONSHIP BETWEEN BUDGET DIFFICULTY AND ACTUAL PERFORMANCE

Managerial incentive schemes

Managers may receive financial rewards (for e.g. bonuses) or non-financial rewards (for e.g. promotion or greater responsibility) based on their ability to meet budget targets.

Budgets by themselves have a limited motivational effect. It is the reward structure that is linked to achieving the budget requirements, or lack of reward for non-achievement, which provides the real underlying motivational potential of budgets. A manager will need to regard the reward as being worthwhile if his behaviour is to be influenced so that he/she strives actively towards the achievement of the budget.

Disadvantages of using pay as an incentive

Formal reward and performance evaluation systems can encourage dysfunctional behaviour. Managers tend to pad their budgets to make the subsequent variances more favourable.

Pay can be a demotivator if targets are not challenging and fair.

Top down & bottom up approaches

Top down / imposed budget

This is also called an 'authoritative' or 'non-participative' budget as it is set without allowing the ultimate budget holder the opportunity to participate in the budgeting process.

These budgets will begin with upper level management establishing parameters under which the budget is to be prepared. Lower-level personnel have very little input in setting the overall goals of the organization as they are essentially reduced to doing the basic budget calculations consistent with directives.

One disadvantage of the top-down approach is that lower-level managers may view the budget as a dictatorial standard. They lack ownership of the budget and as such, they will be reluctant to take responsibility for it. Further, such budgets can sometimes provide ethical challenges, as lower-level managers may find themselves put in a position of ever-reaching to attain unrealistic targets for their units.

However, it can be argued that this top down approach may be the only approach to budgeting which is feasible if

the organisation is newly-formed

the business is very small

low level employees have no interest in participating in the process

they are not technically capable of participating in budget setting

only top level management have access to information which is necessary for budgeting purposes

Bottom up / participative budget

The budget holders have the opportunity to participate in setting their own budgets. In fact, the lowest level organisational units are asked to submit their estimates of expenditure for the next year. Senior management, meanwhile, has made a forecast of the income it expects to receive. There may be a negative variance between the forecast revenue and the sum of the departments' budgets. The variance is resolved by lengthy discussions or arbitrary decisions. This type of budget is also called participative budget.

It is argued that bottom-up budgets improve employee morale and job satisfaction. Furthermore, the budget is prepared by those who have the best knowledge of their own specific areas of operation. This type of budget leads to better communication and increases managers' understanding and commitment.

On the negative side, a bottom-up approach is generally more time consuming and expensive to develop and administer. Another potential shortcoming has to do with the fact that some managers may try to "pad" their budget, giving them more room for mistakes and inefficiency. As we have already discussed, this is known as 'budgetary slack'.

Negotiated budget

In practice, different levels of management often agree budgets by a process of negotiation. The budgeting process is therefore a bargaining process. Budgets lie somewhere between what top management would really like and what junior managers believe is feasible.

Goal Congruence vs Dysfunctional Behaviour

Goal congruence ensures that all members of the organisation pull in the same direction towards helping the organisation to achieve its overall goals and objectives

organisation to achieve its overall goals and objectives.

If individuals in an organisation fail to demonstrate congruent behaviour, decisions taken may benefit that individual personally or the division which that individual works for, but it may not benefit the organisation as a whole – dysfunctional behaviour.

Standard Costing

Standard costing system

Purpose and principles

The purpose and principles of standard costing

A standard cost is a predetermined estimated unit cost of a product or service. Therefore, a standard cost represents a target cost.

Standard costing has a variety of uses

1. it is useful for planning, control and motivation
2. it is used to value inventories and cost production for cost accounting purposes
3. it acts as a control device by establishing standards (planned costs), highlighting activities that are not conforming to plan and thus alerting management to areas which may be out of control and in need of corrective action.

Variances provide feedback to management indicating how well, or otherwise, the company is doing. Standard costs are essential for calculating and analysing variances.

Main types of cost standards

1. Basic standards – these are long-term standards which remain unchanged over a period of years. They are used to show trends over time.
2. Ideal standards – these standards are based upon perfect operating conditions. Therefore, they include no wastage, no scrap, no breakdowns, no stoppages, no idle time. Ideal standards may have an adverse motivational impact because they are unlikely to be achieved.
3. Attainable standards – these standards are based upon efficient but not perfect operating conditions. These standards include allowances for the fatigue, machine breakdown and normal material losses. Attainable standards motivate performance as they

- can be achieved with a certain amount of hard work.
4. Current standards – these standards are based on current level of efficiency. They do not provide any incentive to improve on the current level of performance.

Standard, marginal and absorption costing

The difference between standard marginal and absorption costing

Standard costing systems can be either an absorption costing system or a marginal costing system. These differ in much the same way that ordinary absorption costing and marginal costing systems differ.

Marginal costing systems focus on contribution: in a standard costing system, there is a standard contribution per unit, equal to the difference between the standard selling price and the standard marginal cost.

Absorption costing systems focus on profit per unit, and the standard profit per unit of product is the difference between its standard sales price and standard full cost.

Standard cost per unit

A standard cost card shows full details of the standard cost of each product.

standard cost card - product x		
	\$	\$
direct material x kgs @ \$x	x	
x lts @ \$x	x	
	--	

		x
direct labour x hrs @ \$x	x	
x hrs @ \$x	x	
	--	
		x
		--
standard direct cost		x
variable production overheads		x
		--
standard variable cost of production		x (marginal costing)
fixed production overhead		x
		--
standard full production cost		x (absorption costing)
administration & marketing overhead		x
		--
standard cost of sale		x
standard profit		x
		--
standard sales price		x
		==

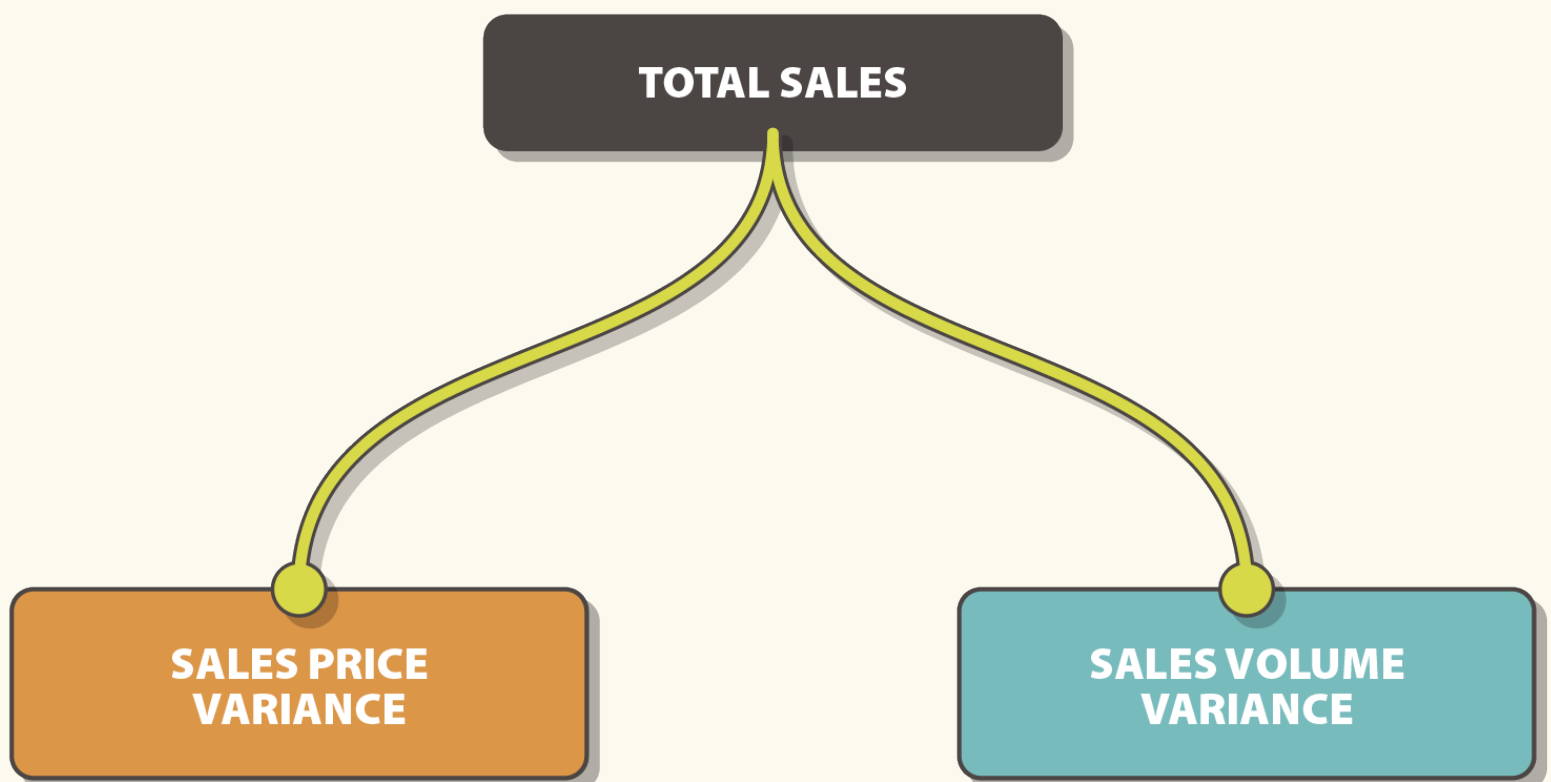
A variance is the difference between a planned, budgeted, or standard cost and the actual cost incurred. The same comparisons may be made for revenues.

The process by which the total difference between standard and actual results is analysed is known as variance analysis.

When actual results are better than expected results, we have a favourable variance (F). If, on the other hand, actual results are worse than expected results, we have an adverse variance (A).

Variance calculations and analysis

Sales price and volume variances



The sales price variance shows the effect on profit of selling at a different price from that expected.

sales price variance =	actual units should have sold	\$x
	actual units did sell	\$x

	sales price variance	\$x (f/a)
		===
sales volume variance =	budgeted sales volume	x units
(absorption costing)	actual sales volume	x units

	sales volume variance in units	x units (f/a)
	x standard profit per unit	\$x

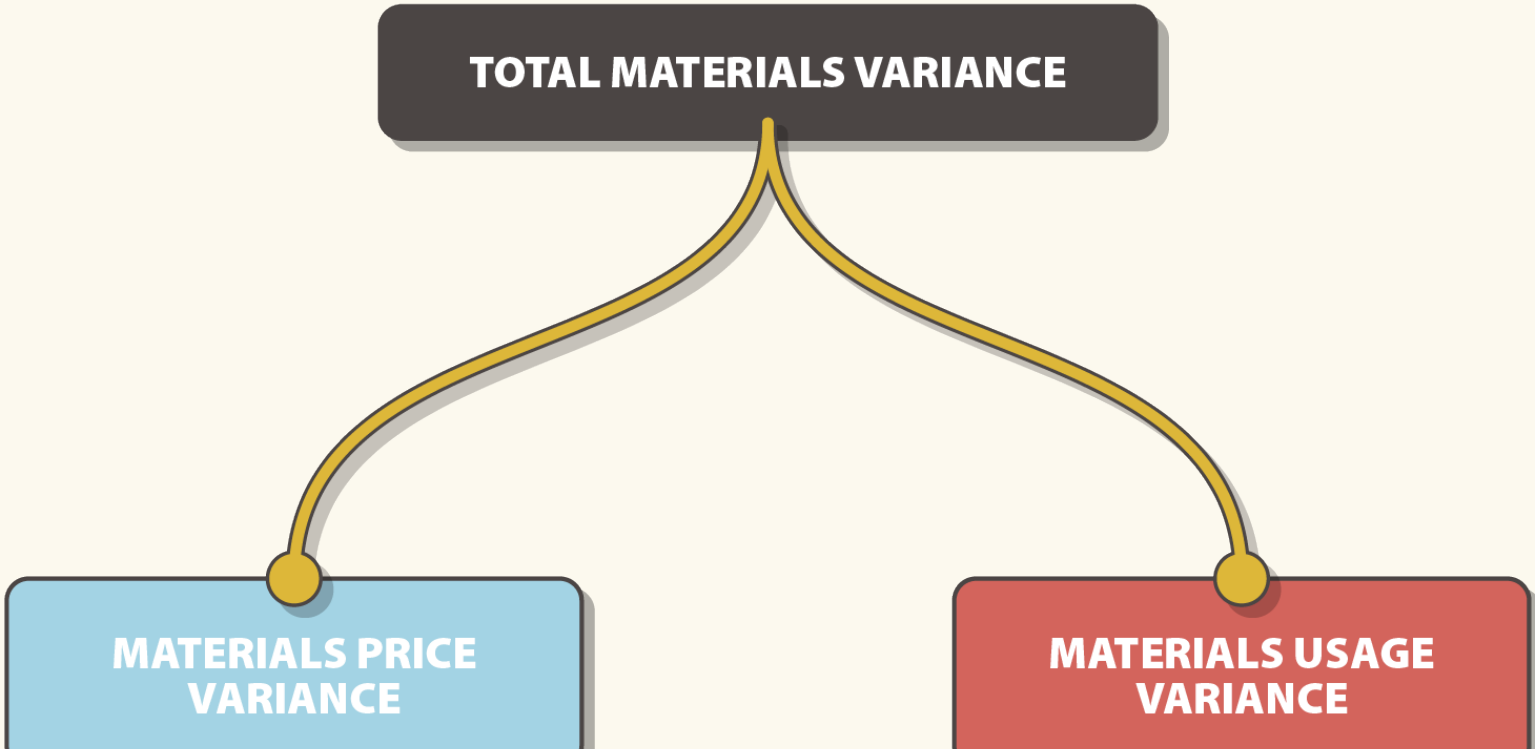
	sales volume variance in \$	\$x (f/a)
		=====
sales volume variance =	budgeted sales volume	x units
(marginal costing)	actual sales volume	x units

	sales volume variance in units	x units (f/a)
	x standard contribution per unit	\$x

	sales volume variance in\$	\$x (f/a)
		=====

Materials total, price and usage variances

The direct material total variance can be subdivided into the direct material price variance and the direct material usage variance.



direct material total variance =	actual units should have cost	\$x
	actual units did cost	\$x

	direct material total variance	\$x (f/a)
		=====
direct material price variance =	actual kgs should have cost	\$x
	actual kgs did cost	\$x

	direct material price variance	\$x (f/a)
		=====
direct material usage variance =	actual units should have used	x kgs
	actual units did use	x kgs

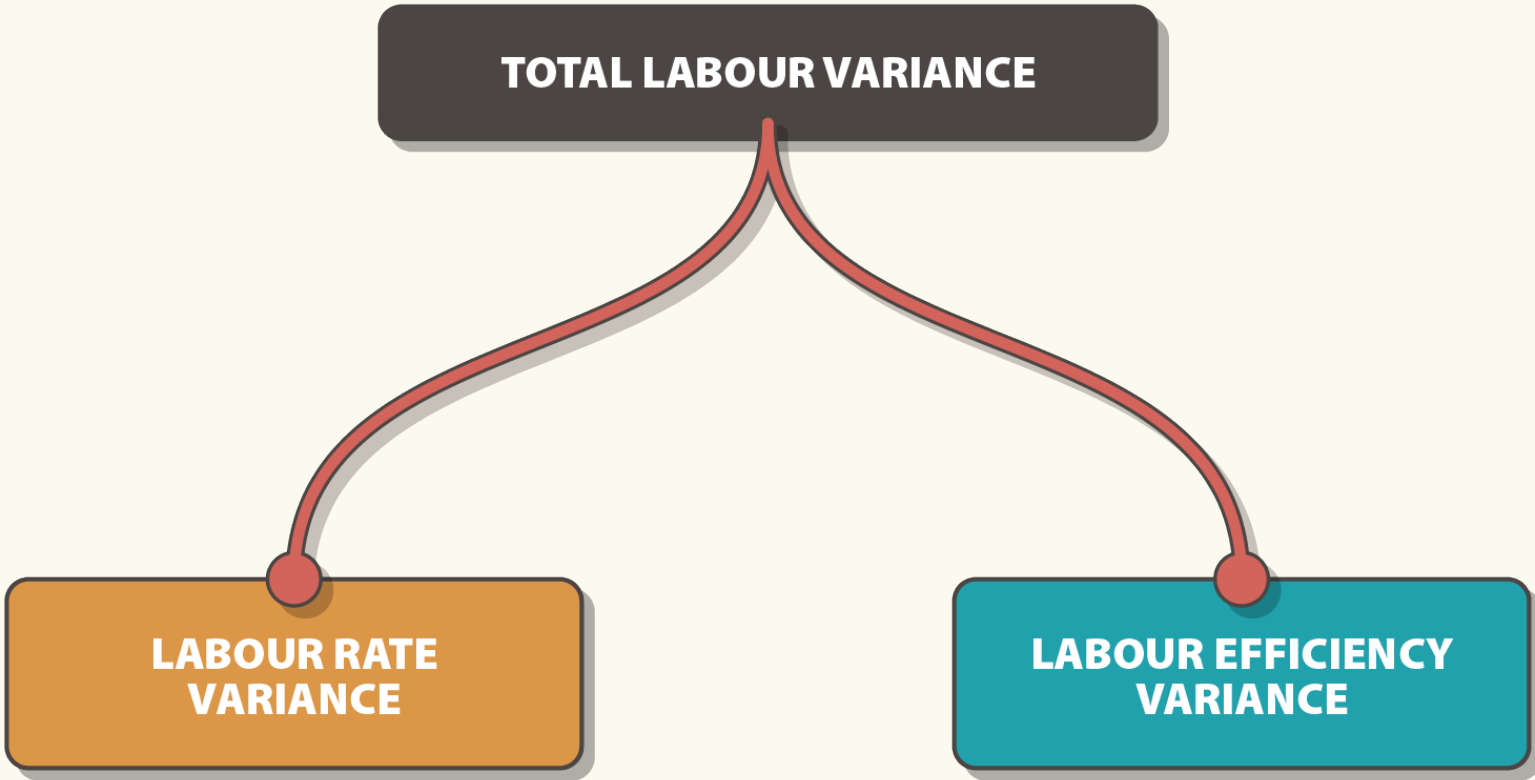
	usage variance in kgs	x kgs (f/a)
	x standard cost per kg	\$x

	x standard cost per kg	\$x

	usage variance in \$	\$x (f/a)
		=====

Labour total, rate and efficiency variances

The total labour variance can be subdivided between labour rate variance and labour efficiency variance.



direct labour total variance =	actual units should have cost	\$x
	actual units did cost	\$x

	direct labour total variance	\$x (f/a)
		=====
direct labour rate variance =	actual hrs should have cost	\$x
	actual hrs did cost	\$x

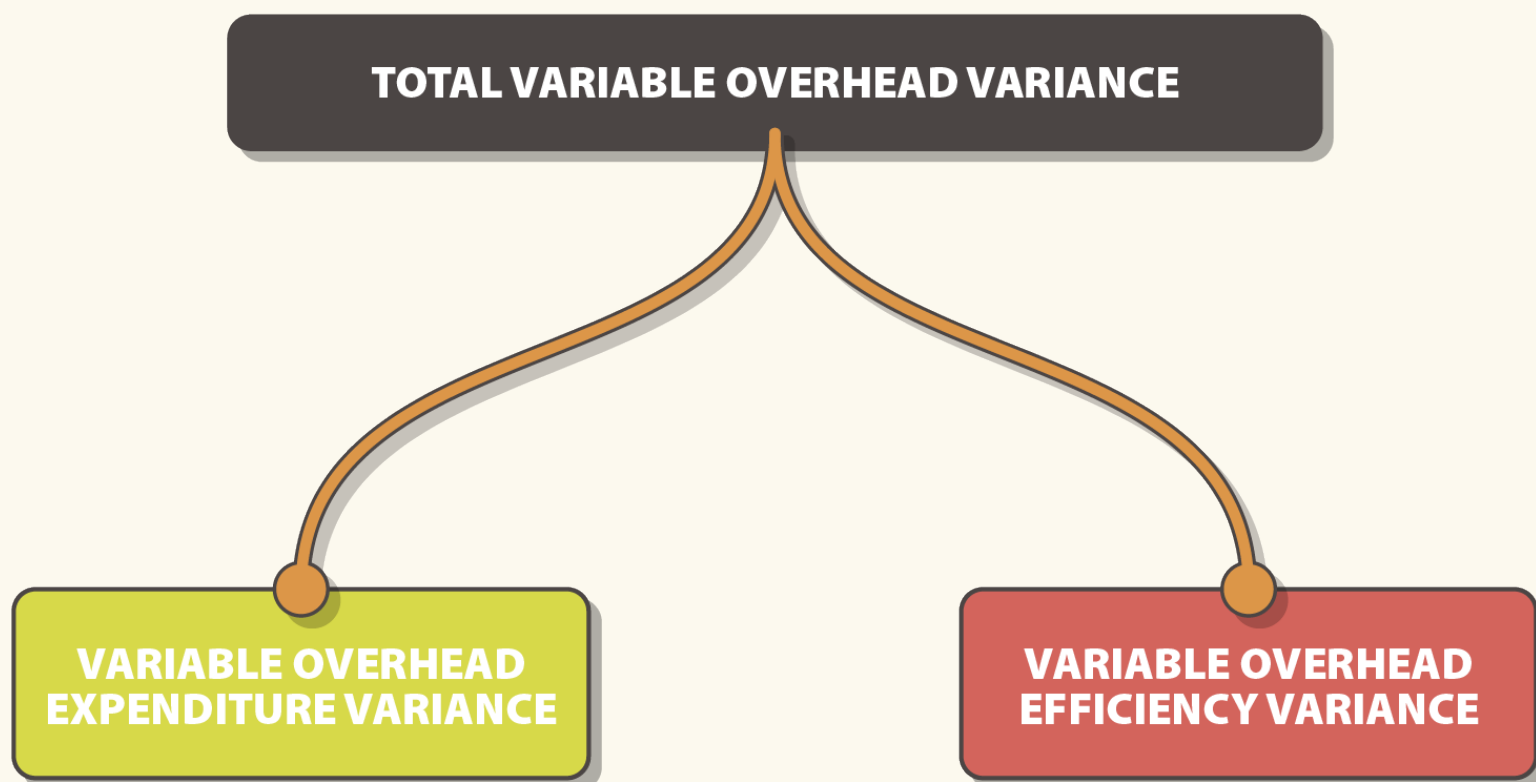
	direct labour rate variance	\$x (f/a)
		=====
direct labour efficiency variance =	actual units should have taken	x hrs
	actual units did take	x hrs

	efficiency variance in hrs	x hrs (f/a)
	x standard rate per hr	\$x

	efficiency variance in \$	\$x (f/a)

Variable overhead total, expenditure and efficiency variances

The variable production overhead total variance can be subdivided into the variable production overhead expenditure variance and the variable production overhead efficiency variance (based on actual hours).



variable overhead total variance =	actual units should have cost	\$x
	actual units did cot	\$x

	var overhead total variance	\$x (f/a)

variable overhead expenditure variance =	actual hrs should cost	\$x
	actual hrs did cost	\$x

	var overhead exp variance	\$x (f/a)

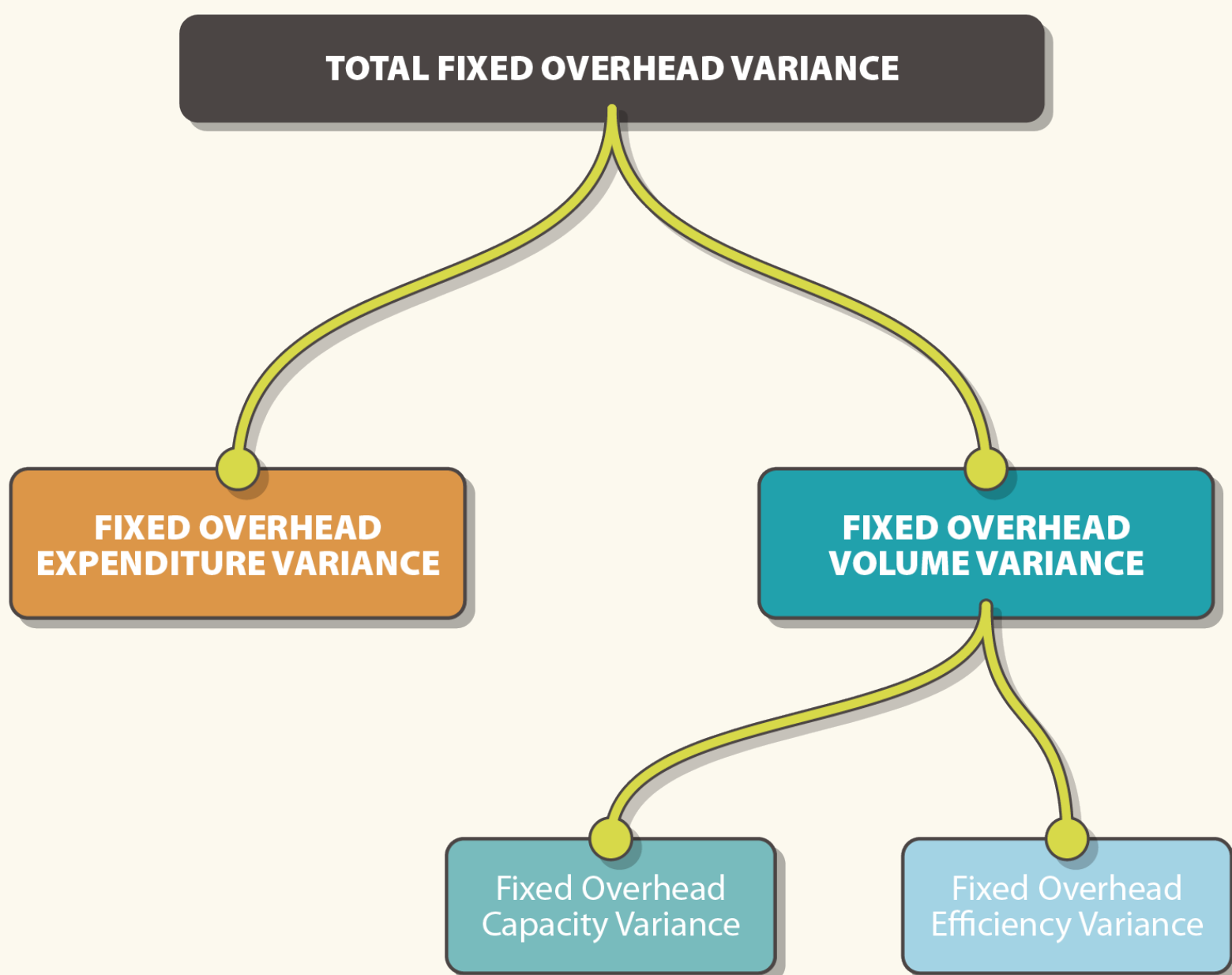
variable overhead efficiency variance =	actual units shd have taken	x hrs
	actual units did take	x hrs

	efficiency variances in hrs	x hrs (f/a)
	x standard rate per hr	\$x

	efficiency variance in \$	\$x (f/a)
		=====

Fixed overhead total, expenditure, volume, capacity and efficiency variances

The fixed production overhead total variance can be subdivided into an expenditure variance and a volume variance.
The fixed production overhead volume variance can be further subdivided into an efficiency and capacity variance.



fixed overhead total variance =	overhead incurred	\$x
	overhead absorbed	\$x

	fix overhead total variance	\$x (f/a)
		=====
fixed overhead expenditure variance =	budgeted overhead expenditure	\$x
	actual overhead expenditure	\$x

	fix overhead expenditure variance	\$x (f/a)
		=====
fixed overhead volume variance =	actual units produced	x units
	budgeted units produced	x units

	volume variance in units	x units (f/a)
	x standard rate per unit	\$x

	volume variance in \$	\$x (f/a)
		=====

The volume efficiency variance is calculated in the same way as the labour efficiency variance

The volume efficiency variance is calculated in the same way as the labour efficiency variance.

fixed overhead vol efficiency variance =	actual units shd have taken	x hrs
	actual units did take	x hrs

	vol efficiency variance in hrs	x hrs (f/a)
	x standard oar rate per hr	\$x

	vol efficiency variance in \$	\$x (f/a)
		=====

The volume capacity variance is the difference between the budgeted hours of work and the actual active hours of work (excluding any idle time).

fixed overhead vol capacity variance =	budgeted hours of work	x hrs
	actual hours of work	x hrs

	vol capacity variance in hrs	x hrs (f/a)
	x standard oar rate per hr	\$x

	vol capacity variance in \$	\$x (f/a)
		=====

Interpret variances & possible causes

Sales variances

The selling price variance is a measure of the effect on expected profit of a different selling price to standard selling price. It is calculated as the difference between what the sales revenue should have been for the actual quantity sold, and what it was.

The sales volume profit variance is the difference between the actual units sold and the budgeted (planned) quantity, valued at the standard profit (under absorption costing) or at the standard contribution (under marginal costing) per unit. In other words, it measures the increase or decrease in standard profit as a result of the sales volume being higher or lower than budgeted (planned).

Possible causes of sales variances

- unplanned price increases
- unplanned price reduction to attract additional business
- unexpected fall in demand due to recession
- increased demand due to reduced price
- failure to satisfy demand due to production difficulties

Materials variances

The direct material total variance is the difference between what the output actually cost and what it should have cost, in terms of material.

The direct material price variance calculates the difference between the standard cost and the actual cost for the actual quantity of material used or purchased. In other words, it is the difference between what the material did cost and what it should have cost.

The direct material usage variance is the difference between the standard quantity of materials that should have been used for the number of units actually produced, and the actual quantity of materials used, valued at the standard cost per unit of material. In other words, it is the difference between how much material should have been used and how much material was used, valued at standard cost.

variance	favourable	adverse
material price	unforeseen discounts received more care taken in purchasing change in material standard	price increase careless purchasing change in material standard
material usage	material used of higher quality than standard more effective use made of material errors in allocating material to jobs	defective material excessive waste theft stricter quality control errors in allocating material to jobs

Labour variances

The direct labour total variance is the difference between what the output should have cost and what it did cost, in terms of labour.

The direct labour rate variance is the difference between the standard cost and the actual cost for the actual number of hours paid for. In other words, it is the difference between what the labour did cost and what it should have cost.

The direct labour efficiency variance is the difference between the hours that should have been worked for the number of units actually produced, and the actual number of hours worked, valued at the standard rate per hour.

In other words, it is the difference between how many hours should have been worked and how many hours were worked, valued at the standard rate per hour.

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variance	favourable	adverse
labour rate	use of apprentices or other workers at a rate of pay lower than standard	wage rate increase use of higher grade labour
idle time	the idle time variance is always adverse	machine breakdown non-availability of material illness or injury to worker
labour efficiency	output produced more quickly than expected because of work motivation better quality of equipment or materials, or better methods. errors in allocating time to jobs	lost time in excess of standard allowed. output lower than standard set because of deliberate restrictions, lack of training or sub-standard material used. errors in allocating time to jobs

Variable overhead variances

The **variable production overhead expenditure variance** is the difference between the amount of variable production overhead that should have been incurred in the actual hours actively worked, and the actual amount of variable production overhead incurred.

The **variable production overhead efficiency variance** is exactly the same in hours as the direct labour efficiency variance, but priced at the variable production overhead rate per hour.

variance	favourable	adverse
variable overhead expenditure	savings in costs incurred more economical use of overheads	increase in cost of overheads used excessive use of overheads change in type of overheads
variable overhead efficiency	labour force working more efficiently (favourable labour efficiency) better supervision or staff training	labour force working less efficiently (adverse labour efficiency) lack of supervision

Fixed overhead variances

Fixed overhead total variance is the difference between fixed overhead incurred and fixed overhead absorbed. In other words, it is the under- or over-absorbed fixed overhead.

Fixed overhead expenditure variance is the difference between the budgeted fixed overhead expenditure and actual fixed overhead expenditure.

Fixed overhead volume variance is the difference between actual and budgeted (planned) volume multiplied by the standard absorption rate per unit.

Fixed overhead efficiency variance is the difference between the number of hours that actual production should have taken, and the number of hours actually taken (that is, worked) multiplied by the standard absorption rate per hour.

Fixed overhead capacity variance is the difference between budgeted (planned) hours of work and the actual hours worked, multiplied by the standard absorption rate per hour.

variance	favourable	adverse
fixed overheadexpenditure	savings in costs incurred changes in prices relating to fixed overhead expenditure	increase in cost of services used excessive use of services change in type of services used
fixed overhead volume efficiency	labour force working more efficiently	labour force working less efficiently lost production through strike
fixed overhead volume capacity	labour force working overtime	machine breakdown, strikes, labour shortage

Factors to consider before investigating

Factors to consider

When deciding which variances to investigate, the following factors should be considered

1. Reliability and accuracy of the figures. Mistakes in calculating budget figures, or in recording actual costs and revenues, could lead to a variance being reported where no problem actually exists (the process is actually 'in control').

2. Materiality. The size of the variance may indicate the scale of the problem and the potential benefits arising from its correction.
3. Possible interdependencies of variances. Sometimes a variance in one area is related to a variance in another. For example, a favourable raw material price variance resulting from the purchase of a lower grade of material, may cause an adverse labour efficiency variance because the lower grade material is harder to work with. These two variances would need to be considered jointly before making an investigation decision.
4. The inherent variability of the cost or revenue. Some costs, by nature, are quite volatile (oil prices, for example) and variances would therefore not be surprising. Other costs, such as labour rates, are far more stable and even a small variance may indicate a problem.
5. Adverse or favourable? Adverse variances tend to attract most attention as they indicate problems. However, there is an argument for the investigation of favourable variances so that a business can learn from its successes.
6. Trends in variances. One adverse variance may be caused by a random event. A series of adverse variances usually indicates that a process is out of control.
7. Controllability/probability of correction. If a cost or revenue is outside the manager's control (such as the world market price of a raw material) then there is little point in investigating its cause.
8. Costs and benefits of correction. If the cost of correcting the problem is likely to be higher than the benefit, then there is little point in investigating further.

Possible Control Action

The control action which may be taken will depend on the reason why the variance occurred.

The variance may be a result of a measurement error, e.g. wastage has been unrecorded, scales have been misread or employees may adjust their records to 'improve' their performance. Control action is required to improve the accuracy of the recording system so that measurement errors do not occur.

In periods of high inflation or where operations are subject to technological development, price standards are likely to become out of date. In such cases, there is the need to frequently review and update standards.

Spoilage and wastage will both negatively affect the efficiency of operations. It is important to highlight the cause of the inefficiency that will lead to control action to eliminate the inefficiency being repeated.

A standard is an average figure, representing the midpoint of different values. Actual results are likely to deviate from this standard. As long as the variance falls within this range, it will be classified as a random or chance fluctuation and control action will not be necessary.

Actual or standard figures

Actual or standard figures where the variances are given

Variances can be used to derive actual data from standard cost details.

Rather than being given actual data and asked to calculate the variances, you may be given the variances and required to calculate the actual data on which they were based.

Reconciliation of budgeted and actual profit

Reconcile profits under absorption

Operating Statement for the period ending(under Absorption Costing)

			\$	
budgeted profit			x	
sales volume variance			x	f
sales price variance			(x)	a

cost variances	\$f	\$a		
materials price		x		
material usage	x			
labour rate	x			
labour idle		x		
labour efficiency	x			
variable overheads expenditure	x			
variable overheads efficiency	x			

fixed overheads expenditure		x		
fixed overheads efficiency	x			
fixed overheads capacity	x			
	----	----		
	x	x	(x)	a

actual profit			x	
			===	

Reconcile profits under marginal

Main differences

The main differences between absorption and marginal costing operating statements are

1. The marginal costing operating statement has a sales volume variance that is calculated using the standard contribution per unit (rather than a standard profit per unit as in absorption costing)
2. There is no fixed overhead volume variance

Operating Statement for the period ending(under Marginal Costing)

			\$	
budgeted contribution			x	

sales volume variance			x	f
sales price variance			(x)	a

cost variances	\$f	\$a		
materials price		x		
material usage	x			
labour rate	x			
labour idle		x		
labour efficiency	x			
variable overheads expenditure	x			
variable overheads efficiency	x			
	----	----		
	x	x	(x)	a

actual contribution			x	
fixed overheads				
budgeted fixed overheads expenditure variance		x x ----		
actual fixed overheads			(x)	

actual profit			x	

Performance Measurement

Performance measurement - overview

Mission statements

Mission statements

The purpose of mission statements and their role in performance measurement

A mission statement contains the overall goals and objectives of the organisation which are not time specific and not quantified,

i.e. what the organization should be doing in the longer term and how it should go about doing it.

Mission statements often include the following information:

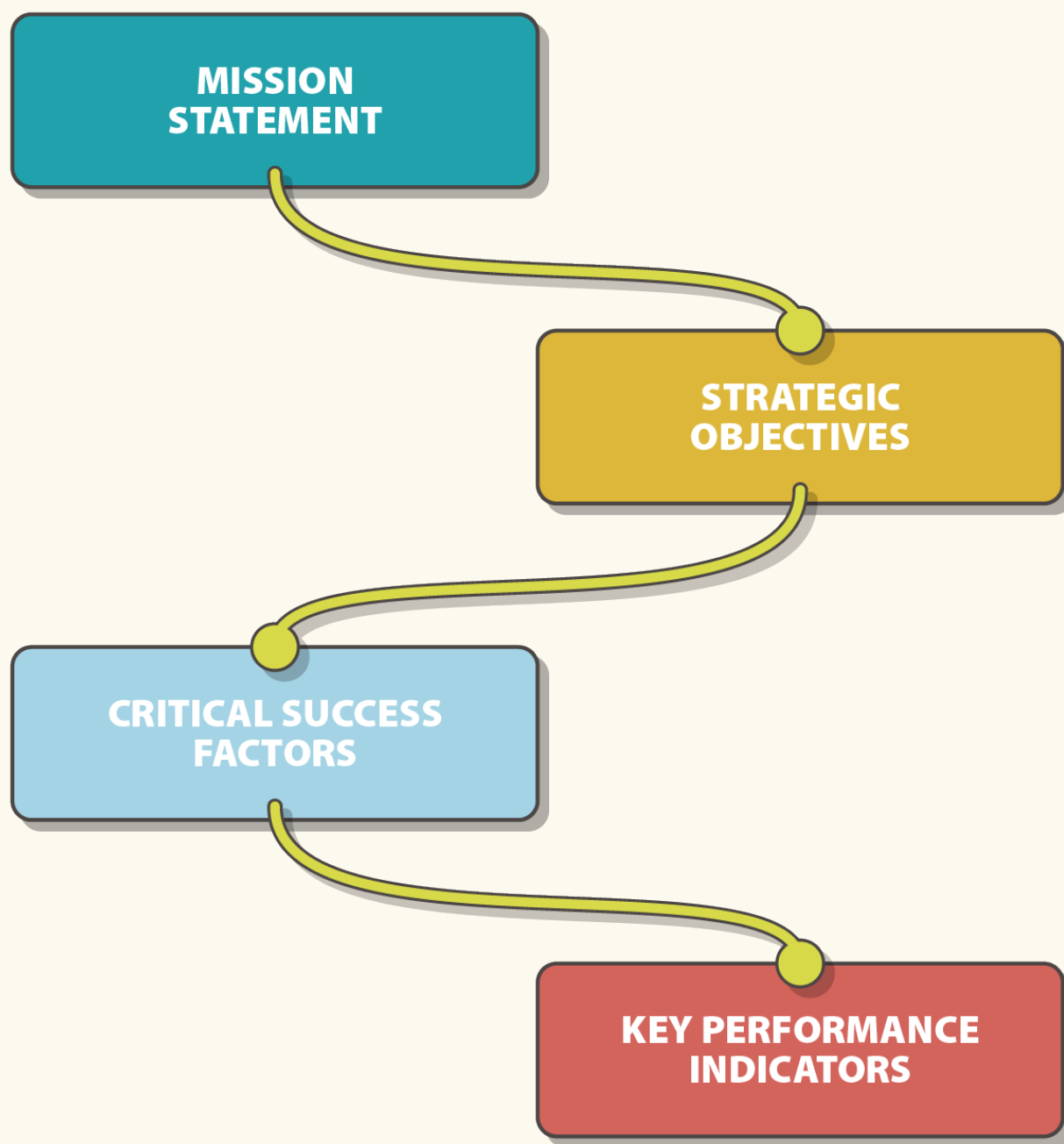
Purpose and aim(s) of the organization

The organization's primary stakeholders: clients/customers, shareholders, congregation, etc.

How the organization provides value to these stakeholders, for example by offering specific types of products and/or services

Strategic, operational and tactical objectives

Strategic, operational and tactical objectives



The purpose of strategic and operational and tactical objectives and their role in performance measurement

Objectives may be developed at strategic, operational and tactical levels in order to allow an organisation to measure progress towards the overall goal.

Suitable performance measures therefore need to be set to monitor the achievement of each objective.

Measures will differ according to the type of objective.

1. Strategic objectives

are often the responsibility of the senior management and will be measured by indicators that reflect the performance of the whole organisation,

e.g. ROI, net profit %.

2. Tactical objectives

2. **Tactical objectives**

are often the responsibility of middle management and measures may be used that summarise the performance of a department or division,

e.g. actual profit compared to budget produced monthly.

3. **Operational objectives**

are often concerned with the day-to-day running of the organisation and are often physical measures,

e.g. quantity of rejects, number of customer complaints produced daily.

Corporate and unit objectives

Corporate objectives

concern the firm as a whole;

e.g. profitability, market share, customer satisfaction quality.

Unit objectives

are specific to individual units of an organisation,

e.g. increase the number of customers by x %;

reduce the number of rejects by x%,

respond more quickly to calls (especially in the case of hospital ambulance service, local police, and firemen).

Primary and secondary objectives

Some objectives are more important than others. Secondary objectives should combine to ensure the achievement of the primary corporate goals.

For example, as its primary objective, a company wants to achieve an increase in profits.

As secondary objectives, it has to aim for sales growth, product quality, customer service and innovation.

The problem of short-termism

Since managers' performance is measured on short-term results, there is a bias towards short-term rather than long-term performance.

Companies often have to make a trade-off between short-term and long-term objectives

e.g. reducing quality control to save operating costs; postponing capital expenditure projects in order to protect liquidity and profits.

Managers may also manipulate results, since bonuses and rewards are often linked to performance.

Economic and market conditions

Economic and market conditions

The impact of economic and market conditions on performance measurement

External factors may be an important influence on an organisation's ability to achieve objectives.

In particular, market conditions and government policy will be outside of the control of the organisation's management and will need to be carefully monitored to ensure forecasts remain accurate

General economic conditions

General economic conditions influence the demand and supply for a company's products.

Government economic policy affects demand quite rapidly.

Changes in interest rates are determined largely by government policy and have a direct effect on credit sales.

Market conditions

A business operates in a competitive environment and suppliers, customers and competitors all influence one another's operations.

The entry of a new competitor will certainly affect the organisation.

the entry of a new competitor will certainly affect the organisation.

Government regulation

Government regulation

Government policy will affect the performance of the different organisations.

The government may raise the taxes on sales and profits and this will surely affect demand

It may provide funds towards new investment and may offer tax incentives

It will influence business through the different legislation,

e.g. companies act, employment law, consumer protection rights

The government's economic policy will affect business activity,

e.g. interest rates (mentioned above), inflation, economic growth.

Performance measurement - application

Measures of financial performance

Measures of financial performance

Key aspect of performance measurement

A key aspect of performance measurement is ratio analysis.

Ratios are of little use in isolation.

Firms can use ratio analysis to compare:

1. budgets, for control purposes
2. last year's figures to identify trends
3. competitors' results and/or industry averages to assess performance.

Manufacturing business

Manufacturing business

Efficiency, capacity and activity ratios

The following are the three main control ratios for measuring performance in manufacturing businesses

1. Efficiency Ratio

The efficiency ratio measures the performance of the workforce by comparing the actual time taken to do a job with the expected time.

Efficiency Ratio =

$$\frac{\text{Expected hours to produce output}}{\text{Actual hours to produce output}} \times 100\%$$

2. Capacity Ratio

The capacity ratio measures the number of hours spent actively working as a percentage of the total hours available for work.

Capacity Ratio =

$$\frac{\text{Number of hours actively spent working}}{\text{Total hours available}} \times 100\%$$

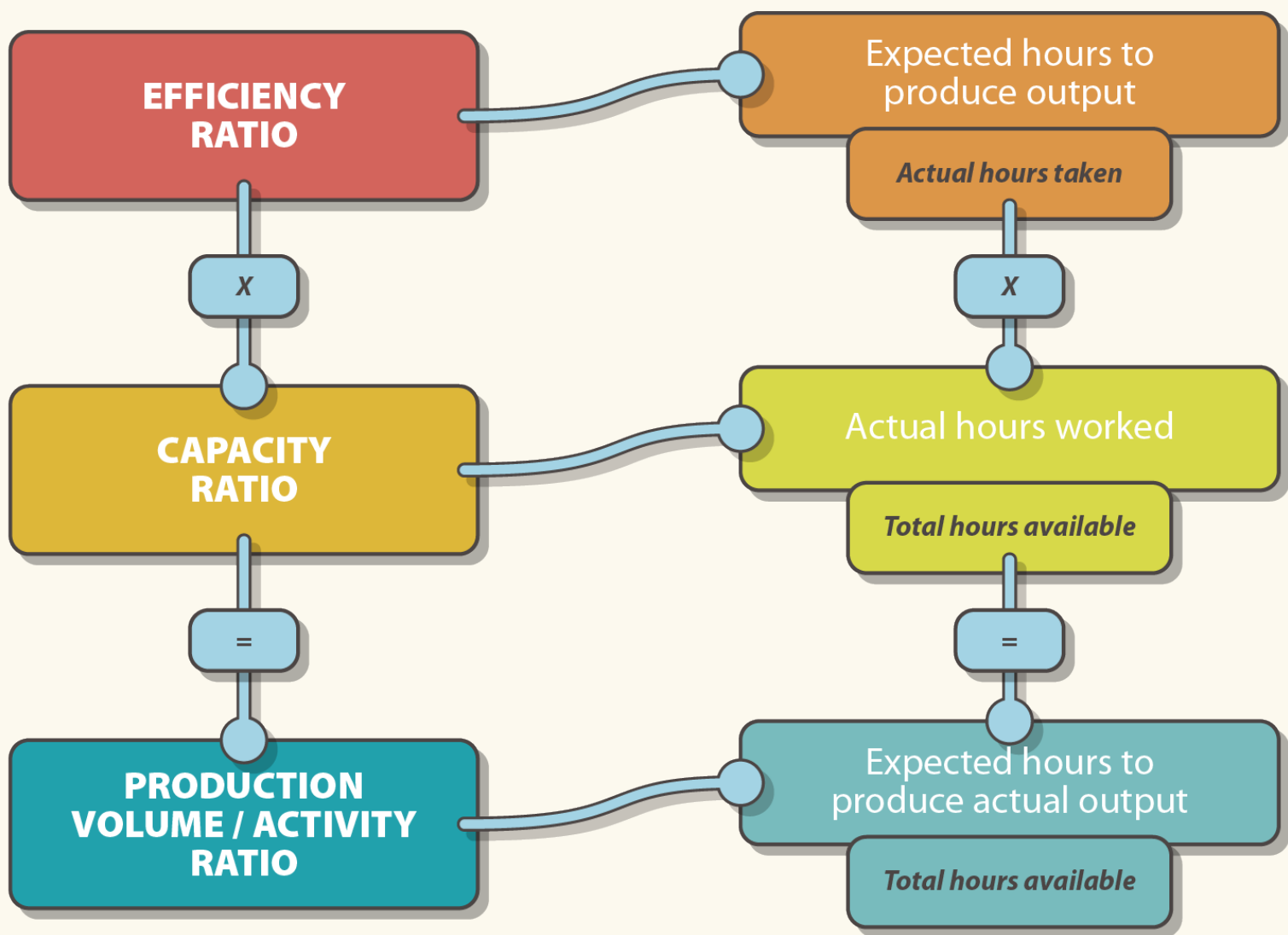
3. Production Volume or Activity Ratio

The activity ratio compares the number of hours expected to be worked to produce actual output with the total hours available

for work.

Production Volume/Activity Ratio =

$$\frac{\text{Expected hours to produce actual output}}{\text{Total hours available}} \times 100\%$$



Measuring Profitability

Return on Capital Employed

The main ratio to measure profitability in an organization is return on capital employed (ROCE).

Capital employed is defined as total assets less current liabilities or share capital and reserves plus long term capital.

It is important to exclude all assets of a non-operational nature,

e.g. trade investments and intangible assets such as goodwill.

ROCE represents the percentage of profit being earned on the total capital employed; and relates profit to capital invested in the business.

Capital invested in a corporate entity is only available at a cost – corporate bonds or loan stock finance generate interest payments and finance from shareholders requires either immediate payment of dividends or the expectation of higher dividends in the future.

ROCE	Operating Profit (PBIT)/Capital Employed
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The primary ratio measuring overall return is analysed in more detail by using secondary ratios

1. Asset turnover
2. Net Profit margin – net profit before interest and tax as a percentage of sales

Net Profit Margin

The profit margin indicates how much of the total revenue remains to provide for taxation and to pay the providers of
financing costs. Profitability ratio

capital, both interest and dividends.

Net Margin	Net Profit/Turnover
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Gross Profit Margin

The trading activities of a business can be analysed using the gross profit margin.

When particular areas of weakness are found, subsidiary ratios are worked out: -

Production cost of sales / sales

Distribution and marketing costs / sales

Administrative costs / sales

Gross margin	Gross Profit/Turnover
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Asset Turnover

The asset turnover indicates how well the assets of a business are being used to generate sales or how effectively management have utilised the total investment in generating income.

Asset Turnover	Turnover/Capital Employed
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Measuring Liquidity

Measuring Liquidity

Liquidity is the ability of an organization to pay its debts when they fall due.

There are two main measures of liquidity:

1. the current ratio
2. the quick (or acid test) ratio

Current Ratio

The current ratio is expressed as:

Current assets : Current Liabilities

If current assets exceed current liabilities then the ratio will be greater than 1 and indicates that a business has sufficient current assets to cover demands from creditors.

Quick (Acid Test) Ratio

This is expressed as:

Current assets – Stocks : Current Liabilities

If this ratio is 1:1, it means that a business has just enough liquid assets to pay its liabilities.

If this ratio is 1:1 or more, then clearly the company is unlikely to have liquidity problems.

If the ratio is less than 1:1 we would need to analyse the structure of current liabilities, to those falling due immediately and those due at a later date.

Measuring Efficiency

Measuring Efficiency

Measures of activity include:

1. Accounts receivable collection period
2. Accounts payable payment period
3. Inventory turnover period

Accounts receivable collection period

This is a measure of management's efficiency and is expressed as:

$$\frac{\text{Receivables} \times 365 \text{ days}}{\text{Sales}}$$

This is an indicator of the effectiveness of the company's credit control systems and policy.

Accounts payable payment period

The creditor days is a measure of how much credit, on average, is taken from suppliers. It is expressed as:

$$\frac{\text{Trade Payables} \times 365 \text{ days}}{\text{Purchases}}$$

This ratio is an aid to assessing company liquidity, as an increase in creditor days is often a sign of inadequate working capital control.

Inventory turnover period

This is expressed as:

$$\frac{\text{Inventory}}{\text{Cost of sales}} \times 365 \text{ days}$$

The holding period may increase because of:

1. Build-up of inventory levels as a result of increased capacity following expansion of non-current assets.
2. Increasing inventory levels in response to increased demand for product.

Working capital period

The working capital period identifies how long it takes to convert the purchase of inventories into cash from sales.

$$\frac{\text{working capital}}{\text{cost of sales/operating costs}} \times 365 \text{ days}$$

Working capital = Inventories + receivables - payables

Measuring Risk

Measuring Risk

Measurement of risk considers the financial risk incurred by borrowing.

Gearing

Capital gearing is concerned with the amount of debt in a company's long-term capital structure. It provides a long-term measure of liquidity. It can be calculated as:-

$$\frac{\text{Long-Term Debt}}{\text{Long-term Debt} + \text{Equity}} \times 100\%$$

If the firm has excessive debt, then the need to pay interest before dividends will increase the risks faced by shareholders if profits fall.

Interest Cover

Interest cover is expressed as:

$$\frac{\text{Profit before interest and tax}}{\text{Interest paid}} = \text{Number of times}$$

This ratio represents the number of times that interest could be paid out of profit before interest and tax.

Non financial measures

Non financial measures

The importance of non-financial performance measures

Profit based measures have the following problems:

1. the subjectivity of profit
2. the scope for manipulation of profit
3. the problem of short-termism

On the other hand, non-financial indicators can provide managers with incentives to improve long-term financial performance.

For example, if customer satisfaction is low, this could imply that sales demand will fall in the future and this will have a negative effect on profits.

The balanced scorecard

The balanced scorecard

In recent years, the trend in performance measurement has been towards a broader view of performance, covering both financial and non-financial indicators.

The most well-known of these approaches is the balanced scorecard proposed by Kaplan and Norton.

The balanced scorecard approach emphasises the need to provide management with a set of information which covers all relevant areas of performance in an objective and unbiased fashion.

The scorecard contains four key groupings of performance measures.

These four groupings, called 'perspectives', were considered sufficient to track the key drivers of both current and future financial performance of the firm.

The perspectives focused on the achievements of the firm in four areas:

1. The financial perspective

concentrates on how the firm appears to its shareholders and considers what the firm's financial objectives are.

The measures used to assess whether these objectives are being achieved typically include, profit, sales, ROI, cash flow or economic value added (EVA).

2. The customer perspective

focuses on the question, what must the firm do to satisfy its customers so as to achieve its financial objectives?

Outcome measures for the customer perspective generally include measures of customer satisfaction, market share, customer retention and customer profitability.

These outcome measures can be sub-divided into driver measures, such as measures relating to lead times, on-time delivery, product quality and product cost.

3. **The internal business perspective**

considers the question, what must the firm do well internally in order to support the product/market strategy and to achieve its financial objectives?

Typical outcome measures include those relating to innovation (product and process) and operations (cycle times, defect rates).

4. **In the learning and growth perspective**

the measures focus on the question what infrastructure must the firm build to create long-term growth and improvement?

In other words, what capabilities must be improved or acquired to achieve the long-term targets for the customer and internal business process perspectives?

Outcome measures may include metrics on employee satisfaction, training and retention.

PERSPECTIVE	QUESTION	EXPLANATION
Customer	<i>What do existing and new customers value from us?</i>	<i>Gives rise to targets that matter to customers: Cost, Quality, Delivery, Inspection, Handling and so on.</i>
Internal	<i>What processes must we excel at to achieve our financial and customer objectives?</i>	<i>Aims to improve internal processes and decision making.</i>
Innovation and Learning	<i>Can we continue to improve and create future value?</i>	<i>Considers the business's capacity to maintain its competitive position through the acquisition of new skills and the development of new products.</i>
Financial	<i>How do we create value for our shareholders?</i>	<i>Covers traditional measures such as growth, profitability and shareholder value but through talking to the shareholder or shareholders direct.</i>

Advantages and limitations of the balanced scorecard

Advantages and limitations of the balanced scorecard

Advantages of balanced scorecard

1. it measures performance in a variety of ways, rather than relying on one figure
2. managers are unlikely to be able to distort the performance measure - bad performance is difficult to hide if multiple performance measures are used
3. it takes a long-term perspective of business performance
4. success in the four key areas should lead to the long-term success of the organisation
5. it is flexible - what is measured can be changed over time to reflect changing priorities
6. 'what gets measured gets done' - if managers know they are being appraised on various aspects of performance they will pay attention to these areas, rather than simply paying 'lip service' to them.

Limitations of balanced scorecard

1. it can involve a large number of calculations which may make performance measurement time-consuming and costly to operate
2. the selection of performance indicators under each of the four perspectives is subjective
3. this in turn will make comparisons with the performance of other organisations difficult to achieve satisfactorily
4. it is also very difficult to set standards for each of the key performance indicators

Critical success factors and key performance indicators

Critical success factors and key performance indicators

Critical success factors (CSFs)

are performance requirements which are fundamental to an organisation's success

(for example innovation in a consumer electronics company) and can usually be identified from an organisation's mission statement, objectives and strategy.

Key performance indicators (KPIs)

are measurements of achievement of the chosen critical success factors. Key performance indicators should be:

1. specific
2. measurable

(i.e. be capable of having a measure placed upon it, for example, number of customer complaints rather than the 'level of customer satisfaction')
3. relevant

in that they measure achievement of a critical success factor.

The following table demonstrates critical success factors and key performance indicators of a college training ACCA students.

perspective	critical success factor	key performance indicators
financial success	shareholder wealth	dividend yield; % increase in share price
	cashflow	actual vs budget debtor days
customer satisfaction	exam success	college pass rate vs national average premier college status tuition awarded to students

		tutor grading by students
	flexibility	average number of course variants per subject (eg full-time, day release, evening)
process efficiency	resource utilisation	% room occupancy average class size average tutor teaching load (days)
growth	innovation products information technology	% of sales from < 1 year old number of online enrolments

The main difficulty with the balanced scorecard approach is setting standards for each of the KPIs.

This can prove difficult where the organisation has no previous experience of performance measurement.

Benchmarking with other organisations is a possible solution to this problem.

Economy, efficiency and effectiveness

Economy, efficiency and effectiveness

A not-for-profit organisation is '... an organisation whose attainment of its prime goal is not assessed by economic measures.

However, in pursuit of that goal it may undertake profit-making activities.' (Bois);

for example charities, statutory bodies offering public transport or the provision of services such as leisure, health or public utilities such as water or road maintenance.

Not-for-profit organisations have multiple stakeholders.

This gives rise to multiple objectives.

Organisations will need to prioritise/compromise as, very often, it is impossible to say which is the overriding objective.

In not-for-profit organisations, performance measures are difficult to define.

Their success cannot be judged against competition nor by profitability.

Hence, other methods of performance have to be used.

Value for Money

In not for profit organisations, performance is judged in terms of inputs and outputs and hence the value for money criteria of economy, efficiency and effectiveness.

Effectiveness is the relationship between an organisation's outputs and its objectives.

It ensures that the outputs of a service or programme succeed in achieving objectives.

Efficiency is the relationship between inputs and outputs.

It is concerned with maximizing output for a given input.

Economy is attaining the appropriate quantity and quality of inputs at lowest cost.

Therefore, economy is concerned with the cost of inputs.

Performance indicator

Performance indicator

Indicators to assess overall performance

1. **Effectiveness**

Financial indicators

- Quality of service/output measures; e.g. exam results; pupil/teacher ratio
- Utilisation of resources; e.g. hospital bed occupancy; are trained teacher fully used to teach the subjects they have been trained for?

- Flexibility; e.g. average waiting time

Non-financial indicators

- Workplace morale
- Staff attitude to dealing with the public
- Client satisfaction in the service being provided

2. Efficiency

Financial indicators to measure efficiency

- Cost per unit of activity (eg cost per student)
- Variance analysis
- Comparisons with benchmark information
- Cost component as a proportion of total costs
- Costs recovered as a proportion of costs incurred
(eg payment received from householders requesting collection of bulky/unusual items of refuse)

3. Economy

A-value-for-money (VFM) audit will look also at the economy of the use of resources, for e.g. in the case of state education,
it will look into the cost wages of school teachers, the cost of books, equipment

Contract and process costing environments

Contract and process costing environments

Contract costing

In view of the large scale of many contracting operations, cost control is very important.

Frequent comparisons of budgeted and actual data are needed to monitor:

Cost over-runs

Time over-runs

In addition, a note has to be made of:

1. ratio of cost incurred to value of work certified
2. amount of remedial work subsequently required

Effectively, the level of profit being earned on the contract can be checked as each architect or quantity surveyor's certificate is received.

In addition, checks should be made on:

1. levels of idle time
2. amounts of wasted material
3. inventory levels
4. utilisation of plant

To keep these at an appropriate level, construction companies will use 'network analysis' to ensure that individual tasks are carried out in a logical order, workers are sent to contract sites at appropriate times and plant only sent when required.

Process costing

As described earlier, process costing is used by is applicable where goods or services result from a sequence of continuous or repetitive operations or processes.

Several key performance measures are required:

1. Levels of abnormal loss
2. Levels of rejected production
3. Production time

In addition, inventory levels and cost targets would be monitored as well as any bottlenecks identified and removed.

Resource utilisation

Resource utilisation

Service Sector

In recent years, the service sector has grown in importance.

Banks, accountancy and consultancy firms, transport companies have all increased.

We shall consider six main aspects of performance in relation to service organisations

1. Financial performance
2. Competitive performance
3. Service quality
4. Flexibility
5. Resource utilization
6. innovation

1. Financial Performance

Traditional financial analysis distinguishes four types of ratio: profitability, liquidity, activity and gearing.

Analysis of a company's performance using accounting ratios involves comparisons with past trends and/or competitors' ratios.

Typical ratios which can be used by a service organisation include

Turnover per product group

Turnover per 'principal' or partner

Staff costs as a % of turnover

Space costs as a % of turnover

Training costs as a % of turnover

Net profit %

Current ratio

Quick asset ratio

Market share

Market share increase

Because it is difficult to trace many common costs to different units of output and because of the high level of stepped fixed costs, detailed financial ratio analysis is of limited use.

2. Competitive Performance

Competitive performance focuses on factors such as sales growth, market share, customer retention and ability to obtain new business.

3. Service Quality

Quality is an important non-financial performance indicator in the service sector.

Inspection and monitoring of the inputs to the service process is very important;

e.g. the quality of solicitors in a practice or the level of staff available in a consultancy organisation.

For example, in the airline industry, service quality could be measured as follows

quality	measures	mechanics
competence and courtesy	staff courtesy and attitude	feedback forms / inspections
cleanliness	facilities and equipment	feedback forms / inspections
availability	equipment availability	internal fault monitors
communication	information clarity	surveys / inspections

4. Flexibility

Three important aspects are

area	measures	mechanics
speed delivery	waiting time in queues	inspection
ability to respond to	diversity of skills	amount of time spent

ability to respond to customers' specifications	diversity of skills possessed	amount of time spent on training
coping with demand	overcrowding: customer queuing time	inspection

5. Resource utilization

Resource utilization is usually measured in terms of productivity. For e.g. in an audit firm, the main input is the time of staff.

The output is the chargeable hours to client.

Productivity can be measured by dividing the chargeable hours with the total available hours.

6. Innovation

Innovation can be measured in terms of how much it costs to develop a new service, how effective the process is and how quickly it can develop new services.

Hence, we can calculate the proportion of new services to the total services provided or the time between identification of a new service and making it available.

Manufacturing Sector

In manufacturing environments, there are four performance measures

a) Cost

area	measures	mechanics
raw material input	actual vs target	calculation of quality and cost
overtime costs	overtime hours / total hours	job sheets / payroll
customer focus	% service calls; % claims	service and claim forms
output	actual vs target output	inspection

b) Quality

area	measures	mechanics
quality of material	% of defected material	inspection
maintenance	breakdown maintenance total maintenance	maintenance records
product reliability	% claims	claims record
customer satisfaction	number of complaints / repeat orders	feedback forms

c) Time

Here, the focus is on throughput, bottlenecks, customer impact and availability.

area	measures	mechanics
throughput	$\text{processing time} \div \text{total time}$	production records
availability	% stock outs	stock records
customer impact	average delivery time	delivery records
equipment failure	time between failures	maintenance records

d) Innovation

area	measures	mechanics
the ability to introduce new products	number of new products launched	production records
ability to accommodate change	number of new processes implemented and time taken to implement	records of process time taken
reputation for innovation	demonstrate competitive advantage	surveys / feedback forms

Profitability in Performance Measure

Profitability in Performance Measure

Decentralisation is the delegation of decision-making responsibility.

Decentralisation is a necessary response to the increasing complexity of the environment that organisations face and the increasing size of most organisations.

One danger of decentralisation is that managers may use their decision-making freedom to make decisions that are not in the best interests of the overall company (so called dysfunctional decisions).

To redress this problem, senior managers generally introduce systems of performance measurement to ensure that decisions made by junior managers are in the best interests of the company as a whole.

Return on investment and residual income

In an investment centre, managers have the responsibilities of a profit centre plus responsibility for capital investment.

Two measures of divisional performance are commonly used:

1. Return on investment (ROI) =

$$\frac{\text{controllable (traceable) profit \%}}{\text{controllable (traceable) investment}}$$

2. Residual income =

controllable (traceable) profit - an imputed interest charge on controllable (traceable) investment.

Advantages of ROI

a simple and low cost calculation – it uses readily available information

a widely used measure, so comparisons with other organizations should be readily available

as ROI gives a result in percentage terms, it can be used to compare units which differ in size

Disadvantages of ROI

the measure is based on accounting information (profit figures and asset figures). Different accounting policies, such as depreciation, may impact the figure calculated

it may be open to manipulation by managers, especially if bonuses are at stake

the measure may be distorted by inflation as historical cost accounts do not reflect the current value of the assets

ROI may discourage investment and re-equipment in more technologically up to date assets.

Old assets, almost fully depreciated, will give a low asset base in the ROI calculation, which will result in an increased figure for ROI and give the impression of an improved level of performance

ROI may lead managers to take decisions which are to their advantage but which do not benefit the organization as a whole - it leads to dysfunctional behaviour

Advantages of RI

investment centre managers see the imputed interest charge – this makes them aware of the financial implications of their investment decisions

RI should avoid dysfunctional decision making – it ensures decisions are taken which benefit both the investment centre and the company or group as whole – goal congruency

Disadvantages of RI

RI is still an accounting-based measure

RI gives an absolute measure – very difficult to compare the performance of investment centres of different sizes – the bigger investment centre will tend to produce the bigger figure for RI

An appropriate target, which is seen to be fair to all divisions, may be difficult to determine

A major problem inherent in the RI calculation is the determination of an appropriate imputed interest rate

Cost reductions and value enhancement

Cost control and cost reduction

Cost control and cost reduction

Cost control

Cost control essentially involves the setting of targets for cost centre managers and then monitoring performance against those targets.

A cost control systems entails six requirements:

effective delegation of authority and assignment of responsibility for costs

an agreed plan that sets up clearly defined and agreed goals

motivation to encourage individuals to reach the goals established and agreed

timely reporting with alternative suggestions how to reduce costs

recommendations and action which must be followed

effective follow-up system to ensure that corrective measures are being effectively implemented

Examples of cost control techniques: - budgetary control, standard costing and control of capital expenditure.

Cost reduction

Cost reduction is the reduction in unit cost of goods or services without impairing suitability for the use intended, i.e. without reducing value to the customer.

Hence, it looks at methods of improving profitability by reducing costs without necessarily increasing prices.

Cost reduction methods

Cost reduction methods

A number of techniques are widely used as a means of attempting to achieve cost reduction, particularly in manufacturing companies.

1. Standardisation of materials and components

This relates to a policy of reducing the variety and range of materials and components purchased by the manufacturer and of components produced.

Advantages

The manufacturer can buy or make large quantities, hence gaining the benefit of reduced unit cost

Having proved the efficiency of a material or component, the manufacturer knows that the quality and content will not change

Inventory control will be easier as there is a reduction in variety

Better service can be provided to customers in the provision of spare parts

Better service can be provided to customers in the provision of spare parts

Less time will be needed to train operatives who handle the component

Disadvantages

If there is only one supplier of the material or component, the manufacturer will be at risk if supplies are interrupted

There may be restriction on the design of a new model if the manufacturer wishes to continue the policy for economic reasons

For the same reason, a standard component may be used in one model when it would be better technically if a special component was used.

2. Standardisation of product

This refers to the production of articles to the same standard, or a range of products each of which is standardised, e.g. a particular model of a car may be available in different colours but apart from this, the cars are identical.

Advantages

The manufacturer derives the benefit of long runs of production with reduced unit cost

Tooling is simpler because it is geared to one method of production

Mechanization can be extensive because of the uniformity of the production method

The consequent buying of large amounts of the same materials and parts results in a reduction of unit cost

Production management is simpler, being confined to standard processes

Less training of operatives is required because the processes do not change

There are fewer demands on the design staff

Inspection costs are low

Customers know they are buying a proven product and that the quality will not change

Disadvantages

the manufacturer may feel safe in doing what he knows best and may become complacent about the success of the product, so that when the product faces new competition or the public becomes disloyal, he is too slow to recognise it

if the product has to be altered, then equipment, technical knowledge and managerial experience may be too fixed to adapt successfully

3. Reducing Labour Costs: Work Study

Work study is a means of raising the productivity/efficiency of an operating unit by the reorganization of work. There are two main parts to work study: method study and work measurement.

Method study is the systematic recording and critical examination of existing and proposed ways of doing work in order to develop and apply easier and more effective methods, and reduce costs.

Work measurement involves establishing the time for a qualified worker to carry out a specified job at a specified level of performance.

4. Other techniques

value analysis and value engineering

investment appraisal techniques applied to re-equipping the factory

zero-based budgeting

A cost reduction team can be used to identify scope for achieving cost reductions but it is important that costs saved do not outweigh the costs of the team itself.

A cost reduction scheme will also bring about changes. These changes may harm morale and upset the proper working of departments. Hence, a cost reduction scheme should have a definite start and finish and should incorporate well-defined targets.

Value analysis

Value analysis

Value analysis is a form of cost reduction. Hence, it examines the factors affecting the cost of a product or service, in order to devise means of achieving the specified purpose most economically at the required standard of quality and reliability.

Are customers willing to pay for upholstery which is relatively expensive for the manufacturer to buy? If customers would pay the same price for a car produced with cheaper upholstery, the company will modify the specification.

Important to distinguish between four types of value

Cost value - the cost of producing and selling an item.

Exchange value – the market value of the product or service.

Use value – the value an item has because of the uses to which it can be put, e.g. using a car to go from A to B.

Esteem value - the value put on an item because of its beauty, craftsmanship etc, e.g. the colour, image or top speed of a car.

The value analysis method

Value analysis can be carried out in 5 key steps

1. establish the precise requirements of the customer for a particular product or service.

Hence the manufacturer can establish whether each function incorporated into the product contributes some value to it

2. Establish and evaluate alternative ways of achieving the requirements of the customers.

The least cost alternative should be selected.

3. Authorise any proposals put forward as a result of step 2

4. Implementation of proposals and follow-up.

5. Evaluate feedback from new proposals to establish the benefits from the change

Value Analysis – Its Benefits

1. Increased sales as customers will be impressed by the interest shown in their requirements
2. higher morale amongst staff resulting from the team approach
3. economic and financial benefits arise from the elimination of unnecessary complexity and the better use of resources

Monitoring performance and reporting

Non-financial performance measures

Short-term and long-term performance

Service industry

Non-profit seeking and public sector

Managerial performance

Managerial performance

Measures that may be used to assess managerial performance and the practical problems involved

The personal performance of the manager is not the same as the overall performance of the responsibility centre he/she manages due to external factors which are outside of the control of the organization.

Hence measures which reflect the performance of the unit as a whole may not reflect the performance of the manager.

There are two main ways of measuring managerial performance

1. use measures based on controllable costs and revenue e.g. variance analysis in cost and revenue centres
2. set specific managerial objectives against which performance can be measured at regular intervals.

Investment centres

In investment centres, divisional performance is measured using:

return on investment (ROI)

residual income (RI)

Benchmarking in Performance measure

Benchmarking in Performance measure

The role of benchmarking in performance measurement

“Benchmarking is the management process which involves comparison of competences with best practice including comparison beyond the organisation’s own industry”

Exploring Corporate Strategy by Johnson and Scholes

Benchmarking requires organisations to:

identify what they do and why they do it

have knowledge of what the industry does and in particular what competitors do

be fully committed to achieving best practice

Types and levels of Benchmarking

1. Internal benchmarks

Comparisons between different departments or functions within an organization

2. Competitive benchmarks

Comparisons with competitors in the business sector through techniques e.g. reverse engineering (buying a competitor's product and dismantling it to understand its content and configuration)

3. Functional (operational/generic) benchmarks

Internal functions are compared with those of the best external practitioners of those functions, regardless of the industry they are in

4. Strategic benchmarks

A type of competitive benchmarking aimed at strategic action and organizational change

The Benchmarking Process

Eight steps are typically employed in the benchmarking process.

1. Identify processes, activities, or factors to benchmark and their primary characteristics.
2. Determine what form is to be used: strategic, functional, competitive, or internal.
3. Determine who or what the benchmark target is: company, organization, industry, or process.
4. Determine specific benchmark values by collecting and analyzing information from surveys, interviews, industry information, direct contacts, business or trade publications, technical journals, and other sources of information.
5. Determine the best practice for each benchmarked item.
6. Evaluate the process to which benchmarks apply and establish objectives and improvement goals.
7. Implement plans and monitor results.
8. Recalibrate internal base benchmarks.

Advantages of Benchmarking

Benchmarking sets the foundation of performance improvement by showing how to improve continuously

It helps with cost reduction

It improves the quality of operations

It can be used both in the public and private sector

It is an effective method of implementing change

Disadvantages of Benchmarking

Benchmarking reveals the standards attained by competitors but does not consider the circumstances under which the competitors attained such standards

A bigger disadvantage of benchmarking is the danger of complacency and arrogance. Many organizations tend to relax after excelling beyond competitors' standards, allowing complacency to develop. The realization of having become the industry leader soon leads to arrogance, when considerable scope for further improvements remains

Many organizations make the mistake of undertaking benchmarking as a stand-alone activity. Benchmarking is only a means to an end, and it is worthless if not accompanied by a plan to change

Management attention and recommendations

Reports highlighting key areas for management attention and recommendations for improvement

When producing reports on this area, it is important to

use an acceptable report format

present calculations of performance measurement in an appendix at the end of the report

offer recommendations and conclusions as to how performance may be improved